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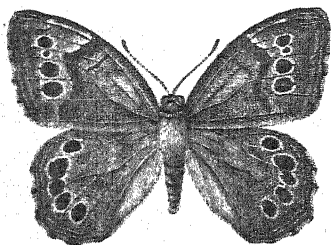
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703

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No. 1.

NEW, OR LITTLE KNOWN, ALEURODIDÆ.—I.

BY A. L. QUAINANCE, ENTOMOLOGIST, FLA. EXP. STATION.

Aleurodes mori, n. sp.

Egg.—Length, .16 mm ; width, .08 mm. ; elliptical, curved, light brownish in colour, marked with minute polygonal areas ; pedicel short, about one-tenth length of egg.

Larva.—Length, .43 mm. ; width, .3 mm., varying somewhat ; shape, elliptical ; colour, whitish or yellowish white. Margin all around dentate, due to the usually short but acute incisions between the closely-set wax tubes. A very fragmentary marginal fringe frequently present ; no sub-marginal rim as in pupa-case. Wax tubes plainly extending mesad four to five times their breadth, then gradually disappearing. Abdominal segments moderately distinct. Eye spots small, reddish. Dorsal tubercles and setæ usually present as on pupa-case, but those of thorax sometimes wanting. Vasiform orifice, operculum and lingula essentially as in pupa-case. Exuviae from preceding moults frequently remain attached to larva.

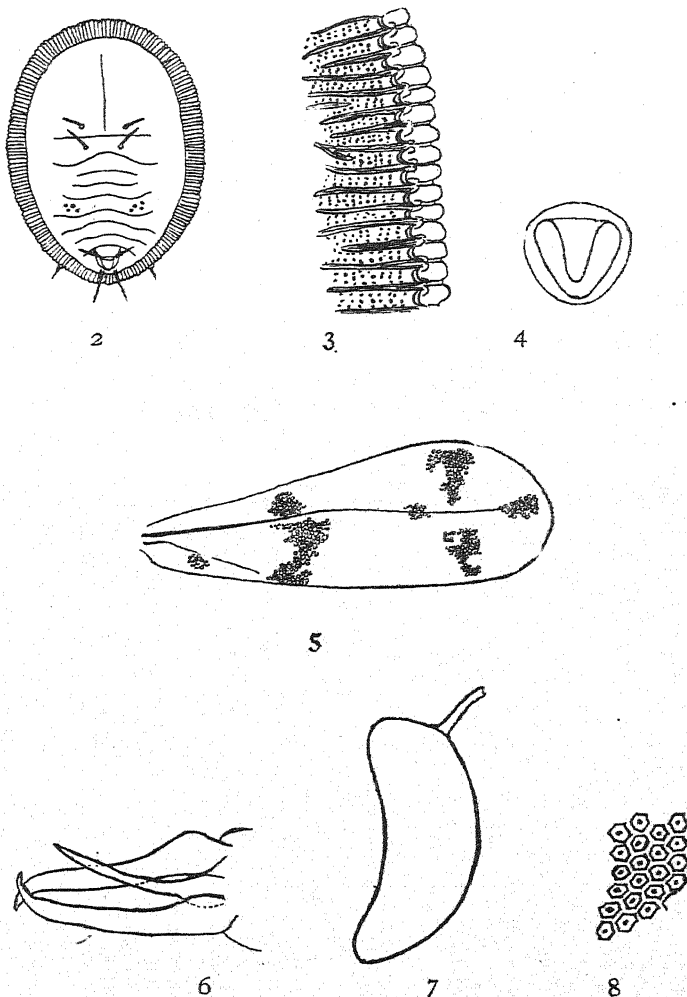
Pupa-case.—Length, .7 mm ; width, .55 mm. ; shape elliptical, varying somewhat in size and shape. Under hand-lens, shiny black in colour ; dark brown by transmitted light under microscope. Conspicuous white cottony fringe all around ; wax rods, closely matted together at base, distinctly becoming more separated, giving the outer margin of fringe a ragged appearance. There is a distinct marginal rim of wax tubes, which extend mesad with varying distinctness to the inner margin of rim. Outer margin crenulated, due to the shallow and usually rounded indentures between wax tubes ; rim marked with minute dots.

Abdominal segments moderately distinct ; abdomen slightly raised along dorsi-meson, particularly from about the third segment caudad, including vasiform orifice. Third thoracic segment moderately distinct, straight. A median suture extends cephalad to marginal rim from first abdominal segment. On the dorsum of both thorax and metathorax

near dorsi-meson is a pair of small brown setæ; also a pair of setæ near vasiform orifice, and on caudal margin of case. This latter pair is usually larger than the others, the setæ extending dorso-caudad, some distance beyond the margin. There is a pair of minute setæ on the margin of case, one on each side, near the caudo-lateral region. On the fourth abdominal segment on each side there is a group of from four to six minute pores. One or two pores are sometimes present on fifth segment on each side, just caudad of those on fourth. Vasiform orifice somewhat elevated, small, sub-elliptical, wider than long. Operculum nearly filling orifice; cephalic edge straight, lateral and caudal margins parallel with margins of orifice. Lingula rather short, not reaching margin of operculum. Rudimentary feet on ventral surface distinct.

Adult.—♀. Length about .8 mm.; length of front wing, .833 mm.; width of front wing, .3 mm.; length of antennæ about .25 mm.; length of hind tarsus, .16 mm.; length of hind tibia, .28 mm. Colour, bright yellow; tarsi and distal end of tibiæ more or less reddish; eyes deep brownish-red, varying to brownish-black. Wings all around on margin reddish, deepest on cephalic margin of first pair. First pair of wings spotted with bright red and brownish-black; two irregular red spots near proximal third, one on each side of the main vein, the smaller spot on cephalic side; caudal spot irregularly T-shaped. There are three or four brownish-black spots on the distal fourth of wing; one at tip, into which the vein merges, one cephalad, and one caudad of vein, with a fourth sometimes present near vein, somewhat proximad of the others; a light clouding may also sometimes occur at base of wing just caudad of basal veinlet.

Antennæ of seven joints. First joint short, sub-conical, not quite one-half length of second; second joint pear-shaped, somewhat truncate distally, about three-fourths as wide as long; third joint long, slender, slightly longer than the distal four together; fourth short, cylindrical, about one-half length of fifth; fifth, sixth and seventh subequal in length; fifth and sixth sub-cylindrical; seventh somewhat fusiform, tapering distally and bearing a terminal seta. Joint third, and distally, rather minutely ringed. In third pair of legs, femur about three-fourths length of tibia. Tarsus and claw together about three-fourths length of tibia. Distal tarsal joint, excluding claw, four-fifths length of proximal. Mentum three jointed; proximal joint long, slender, about six-sevenths length of distal two together; second joint short; third, about a fourth longer than



ALEURODES MORI, QUAINANCE.

- FIG. 2.—Pupa-case, showing structural details.
 FIG. 3.—Margin of pupa-case, greatly enlarged.
 FIG. 4.—Vasisform orifice, operculum, and lingula of pupa-case.
 FIG. 5.—Right fore wing of female.
 FIG. 6.—Genitalia of male.
 FIG. 7.—Egg.
 FIG. 8.—Illustrating the polygonal markings on egg.

second. Mentum club-shaped, thickest at distal part of second joint, tipped with black. Rostrum short, conical, bearing three long setæ.

Eyes oblong, constricted somewhat above the centre, giving somewhat of a "dumb-bell" shape. Dorsal tubercle (operculum) when elevated and seen in lateral aspect, conical; lingula long, tapering, covered with minute hairs. Operculum, when not elevated, and seen in dorsal aspect, strongly convex, bearing a row of minute hairs on caudal margin; lingula protruded, reaching considerably beyond operculum. Genitalia acutely conical. Margin of wings delicately beaded all around; beads setate. At base of second pair, on cephalic margin, are seven to nine setæ, four of which are usually paired. Median vein of first pair of wings unbranched, extending almost to distal end of wing; nearer cephalic than caudal margin proximad, but curving gradually caudad in distal half, dividing this part approximately in the middle. A short veinlet arises from base, apparently distinct from median, and extends obliquely to caudal margin of wing.

Length about .58 mm.; proportionately smaller than female. Genitalia forcipate; penis about three-fourths the length of valves; curved, suddenly enlarged at base. In other respects essentially as in female.

This Aleurodid occurs in great abundance on the under surface of the leaves of mulberry (*Morus*) at Tampa, Florida. Figure 1, from photograph, enlarged about two-thirds diameter, will serve to illustrate this. The insect occurs in some abundance at Lake City, on the leaves of various trees, as *Telea Americana*, *Callicarpa Americana*, *Liquidamber styraciflua*, *Ilex opaca*, and less frequently on *Persea Carolina*.

Under date of April 26th, 1898, Prof. Cockerell sent me specimens of what are doubtless this insect, on a creeper from Kingston, Jamaica.

ODOUR OF SAN JOSE SCALE, ASPIDIOTUS PERNICIOSUS.

BY F. M. WEBSTER, WOOSTER, OHIO.

In the many accounts of this insect, I do not recall that attention has been called to the odour that is associated with this insect, and which, in cases of excessive abundance, can be detected at a considerable distance away. Where the air is quiet it is often possible to detect the presence of a badly infested tree a yard away, and I presume that with more acute olfactories, such as insects are supposed by many to possess, even the presence of a more limited number of the scale might be detected at a much greater distance. As ants do not appear to be at all partial to this Coccid, at least in this country, it is not easy to understand what influence this odour can have in the economy of the species. It is possible that, in its native home, this odour might attract other insects and thus afford a means of diffusion, not at present so available to the scale in this country.

FIVE NEW COCCIDÆ.

BY EDW. M. EHRHORN, MOUNTAIN VIEW, CAL.

Ripersia arizonensis, n. sp.

♀ enclosed in a broadly oval snow-white waxy sac, about 3 mm. long, 2 mm. wide, $1\frac{1}{2}$ mm. high, sac widest between middle and caudal end.

♀ oval, about one-third longer than broad, shiny, light purplish-brown, about 3 mm. long. When boiled in K. H. O. turns reddish-brown. Derm colourless, with numerous bristles scattered over the dorsum. Antennæ 6-jointed: 6 longest, joint 4 shortest; formula, 6, 1, 2, 3, 5, 4. Each joint with several hairs, joint 6 quite bristly. Legs light brown, quite stout. Femur longer than tibia. Tibia very little longer than tarsus. Tarsal digitules long fine hairs. Claw slender and curved, digitules of claw very short and slender. Anal lobes prominent, with very long bristle at tip, and several stout ones on its margins. Anal ring large, with 6 bristles. *Hab.*—In ants' nest on the roots of grass and *Artemisia*, sp., Camp Thurber, Grand Canyon of the Colorado, Arizona.

[This peculiar insect may form the type of a new sub-genus, *Cryptoripersia*, Ckll., which will be distinguished by the possession of a complete subpyriform brittle sac. The following measurements in μ μ will assist in the recognition of *Ripersia arizonensis*: Anterior leg: femur, 116; tibia, 83; tarsus, 6c. Antennal segments: (1) 41, (2) 33, (3) 33, (4) 25, (5) 33, (6) 61.—T. D. A. CKLL.]

Kermes ceriferus, n. sp.

♀ scale globular, about 4 to $4\frac{1}{2}$ mm. in diameter, ground colour brown, shiny, dotted with black spots. Scale completely covered with dirty white wax. Segmentation obsolete, only indicated by black markings. Ventral slightly pubescent. After boiling in K. H. O., derm colourless, with numerous small round glands and brown spots. Antennæ very small, joints obscure, last joint with numerous hairs. Legs quite stout, claw curved.

Larva about twice as long as broad, reddish, turning yellow when dead. Eyes red. Antennæ 6-jointed: joints 3 and 6 about equal, joints 1 and 2 equal, and 4 and 5 equal. Formula (63)(12)(45). Rostral loop reaching half way between last pair of legs and tubercles. Legs large and stout. Tarsus twice as long as tibia. Claw long and curved. Margin of each segment with stout curved spine. Caudal tubercles very large, each bearing one very long bristle and three stout spines.

Hab.—On *Quercus*, sp. Walnut Creek Canyon, near Flagstaff, Ariz.
Ripersia villosa, n. sp.

♀ in clusters and single in the crotches of twigs of oak. Sac loosely woven of long white wool, oval, about 2 mm. long and 1 mm. broad.

♀ when removed from sac bright crimson, slightly covered with white powder, skin shiny; about 1.5 mm. long, 1 mm. broad, tapering anteriorly and quite convex dorsally. When boiled in K. H. O., derm colourless, densely covered with slender hairs. Antennæ light brown; 7-jointed. Joint 7 longest. Sometimes joint 1 is next longest, but joint 2 is often longer than 1, and in many cases they are subequal; joint 6 usually next, although joint 3 may be longer than 6; joint 4 next, often subequal with 5; sometimes 3 shortest, sometimes 5; 3 and 5 often subequal. In fact, the sequence of the joints is quite variable, as is shown in the following antennal formulæ:

$$\begin{array}{l} 721(36)(45) \\ 7(12)6(45)3 \\ 71264(53) \\ 7(12)64(53) \end{array}$$

Joint 1 is stouter than any of the others. Each joint with hairs, joint 7 with several stout hairs. Legs light brown, large and stout; each joint furnished with one or more rather long bristles. Femur, 80 × 50 μ. Tibia, 70 μ. Tarsus, 50 μ. Claw, 20 μ. Digitules of claw knobbed, moderately short and stout. Tarsal digitules long, fine, slightly knobbed hairs. Tubercles small and rounded, with long stout bristle. Anal ring with six stout hairs.

Larva when newly hatched, colour light red, rostral loop extending beyond body.

Hab.—On *Quercus agrifolia*, at Berkeley, California.

[This species is probably most nearly allied to *Dactylopius Quaintancii*, Tins., from which it differs in being more distinctly a *Ripersia* in the general appearance of both the antennæ and legs.—J. D. TINSLEY.]

Dactylopius formicarii, n. sp.

♀ small, broadly oval, slightly covered with powder, about 2 mm. long and 1 mm. broad. Colour yellowish-brown; when boiled in soda, turns red. Epidemis of dorsum with scattered spinnerets and hairs on thorax; on abdomen these become more numerous posteriorly, especially the hairs, which are quite numerous on the last 4 segments. Ventrally the long slender hairs are quite numerous on all the segments, but especially so on

the last abdominal segments. Sides with rows of spinneret spine areas. Antennæ 8-jointed in some, 7-jointed in others, nearly concolorous with the body. Joint 8 longest; next is 2, joint 1 usually next, although 3 may be longer; 5 next, always appreciably longer than 7; 6 may be either shorter or longer than 7; 4 always shortest.

Many of the antennæ are 7-jointed through failure of the 3rd to divide; the 3rd is always then quite long. Formulæ:

8-jointed = 82135764.

7-jointed = 7321456.

The joints of the antennæ bear very long, rather stout, hairs.

Legs stout and quite hairy. Femur shorter than tibia. Tibia, 215 μ long. Tarsus, 110 μ long. Claw rather stout, 37 μ long. Digitules of claw fine knobbed hairs reaching beyond claw. Tarsal digitules long slender hairs. Caudal lobes small, rounding, with one very long (200 μ) stout bristle and several shorter ones, also numerous round glands. Anal ring large, with 6 moderately long hairs.

Hab.—In ants' nests on the roots of *Artemisia*, sp. Thurber's Camp, Grand Canyon of the Colorado, Arizona.

[Antennal formula approaches that of *D. solani*, Ckll., but the great hairiness of the body and antennæ readily separate it from that species.—J. D. TINSLEY.]

Kermes Pettiti, n. sp.

♀ scale about 4 mm. broad, 3 mm. long, and 3 mm. high, dark purplish-brown; some individuals of a lighter colour and marbled with brown. A distinct longitudinal groove on the meson indicated by a dark line. Surface without minute black specks. Segmentation not very distinct, indicated by rows of black spots plainly seen through a pocket lens. Ventral surface, where it touches the bark, flattened and more or less covered with a yellow secretion. Beak very prominent. When removed from twig scale leaves a whitish powder. When boiled in K. H. O., derm colourless, except numerous brown spots with black centres scattered over the dorsum. Antennæ very obscurely 6-jointed, joint 3 apparently longest. Legs very small and stout. Tibia as broad as long, with a stout spine. Femur and tibia about equal. Tarsus nearly twice as long as tibia. Claw straight.

Hab.—On *Quercus*, sp.; Ithaca, N. Y.; sent to me by Mr. R. H. Pettit as *K. galliformis*, Riley. I take pleasure in naming this species after the collector. Specimens have been examined by Mr. Cockerell, who agrees that they represent a new species.

PAPILIO AJAX, VAR. MARCELLUS, IN BRITISH COLUMBIA.

I have lately received from Mr. C. De Blois Green a painting, natural size, of a butterfly which is undoubtedly *P. Ajax*, var. *Marcellus*. Mr. Burton, the captor, took the specimen on the Cowichan River, near Duncan's, in Vancouver Island, where he spends part of every summer fishing. It was upon one of these expeditions that the specimen referred to was taken, and another one was seen during the same summer, but not secured. The painting which was afterwards made by his wife is well done, and there is no doubt at all about the species. Mr. Burton formerly collected insects in England, but has not exchanged with anyone in the United States, or even had a collection in his possession for many years. There is hardly a possibility, therefore, that any mistake has been made as to the actual locality where this specimen was caught.

A point of considerable interest is, What was the food plant of the larvæ of these butterflies? The Papaw, which is, as far as I know, the only food plant, does not grow in British Columbia, nor, as far as I am aware, further west than Nebraska.

I shall be obliged if any reader of the CANADIAN ENTOMOLOGIST can give any further information on the food plants of this species, or suggest any probable food plant upon the Pacific coast.

J. FLETCHER.

DESCRIPTION OF A NEW PSILOPA.

BY D. W. COQUILLET, WASHINGTON, D. C.

Psilopa petrolei, new species.

Black, polished, not light coloured, pruinose except the lower part of the occiput, cheeks and sides of face, which are thinly grayish pruinose; halteres yellowish, the knobs white. Eyes densely hairy, most approximate at middle of face. Third joint of antennæ slightly longer than the second, the spine of the latter not reaching beyond the apex of the antennæ. Wings hyaline, tinged with gray on nearly the costal half, except sometimes a spot toward apex of the submarginal cell; apex of second vein nearly twice as far from the first as from the apex of the third vein. Length, 2 mm.

Described from eight specimens reared from larvæ living in crude petroleum near Los Angeles, Cal.

Type No. 4,100, U. S. N. M. This description is published at the request of Dr. L. O. Howard, who has prepared an article on the habits of the insect.

LIFE-HISTORY OF THE SHEEP SCAB-MITE, PSOROPTES COMMUNIS.

BY C. P. GILLETTE, FORT COLLINS, COLORADO.

I am not aware that the full life-history of this insect has been published, though I shall not be surprised to learn that such is the case.

In order to know how long a time should intervene between the first and second dippings for the cure of scab, we must know the period of incubation and also the entire time elapsing from the deposition of the egg up to the time that the mite from that egg, if a female, may be itself depositing eggs. These points were determined in a series of experiments conducted by the writer one year ago and were reported in a local paper, the "Fort Collins Courier," last spring. I took seventy-five eggs from a lock of wool drawn from the back of a badly infested lamb, and, after dividing them in two nearly equal lots, placed them at once on the skin of the backs of two lambs that were not infested with the mites at the time. In order to irritate the surface a little and better prepare it for the little mites that would begin at once to hatch, a lock of wool was drawn in each case from the particular spot where the eggs were placed.

Mr. Ball, assistant in my department, made a careful examination of these "cultures" once a day until the mites from the eggs were fully grown and themselves laying eggs.

At the first examination a few young mites were found, which was to be expected, as a few eggs among so many would be about ready to hatch. At the end of the fourth day all the eggs had hatched. At the end of the ninth day a few individuals were found in copula; and on the eleventh day eggs were found. As it required four days for the newly deposited eggs to hatch, the entire time elapsing from egg to egg would be fourteen or fifteen days.

As there would be eggs in all stages of incubation upon a sheep when the latter is dipped for the cure of scab, I have set the limit of time for the second dipping at not sooner than five days, and not later than ten days after the first dipping. If the second dipping comes at a time outside this limit, there will probably be eggs upon the sheep again.

AMERIA TEXANA, FRENCH.

From a comparison with an example recently sent me by Mr. Harrison G. Dyar, from the Smithsonian Institution, I find that this is synonymous with *Pagara simplex*, Walker. *Ameria texana* will then be known as a synonym.

G. H. FRENCH.

ASPIDIOTUS FERNALDI (CKLL.), SUB-SP. COCKERELLI,
SUB-SP. NOV.

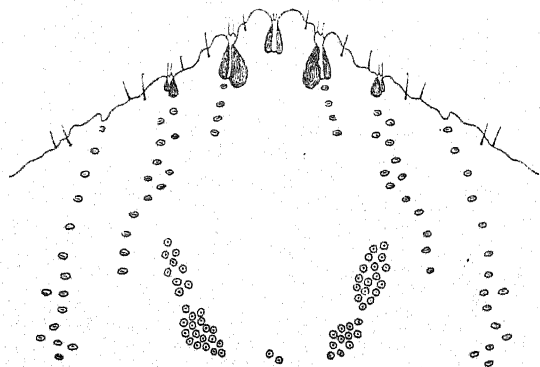
BY PERCY J. PARROTT, MANHATTAN, KANSAS.

♀ scale nearly circular, somewhat flattened, little convex, roughish, dark gray above bark, reddish-brown below bark, 2 mm. diameter; exuviae little exposed, often concealed by whitish secretion, orange, placed to one side of centre; ventral scale, delicate and white; old scales dark brown, often almost black. Scales are thickly massed.

♀ oval, white, marked with irregular light yellow spots; first and second lobes, and margin of last segment, yellowish.

Five groups of ventral glands; median 2 to 5, cephalolaterals 11 to 18, caudolaterals 7 to 18.

Two pairs of well-developed lobes; the mesal somewhat oblique, with one notch on lateral margin; the second pair somewhat angular and inclined to mesal lobes, notched on margin; dark, unequal processes mesal of mesal lobes and sides of incisions, those mesal of first incision large and conspicuous. (Fig. 9.)



A fernaldi
Manhattan sub cockerelli
KS

FIG. 9.—Characters of female. (Original.)

One small spine on lateral of mesal lobes, two conspicuous ones on margin of 2nd pair of lobes and lateral of 2nd pair of incisions, respectively.

Plates simple, often undiscernible; when present, one or two caudad of each incision.

Very common under the rough bark on the trunks of maples in Manhattan, Kans. Collected Sept. 18, 1898.

"The species is closely allied to *Aspidiotus Fernaldi*, Ckll., which occurs on honey locust in Massachusetts, but differs from it by the narrower, notched, median lobes and the more numerous glands in the groups."

It is with the greatest pleasure that I dedicate this species to Prof. T. D. A. Cockerell, who first led me to study the Coccidæ, and has given me his valuable assistance and encouragement while studying them. I am also indebted to him for the quoted passages, which I have taken from his manuscript.

Scales were collected from Juneberry in the same vicinity as the maples, which intergrade between the maple insect and *Fernaldi*. "They constantly agree with the maple species in having many glands in the groups, but some have lobes as in the maple species, while others have lobes just as in *Fernaldi*. (Fig. 10.) Some of the Juneberry specimens

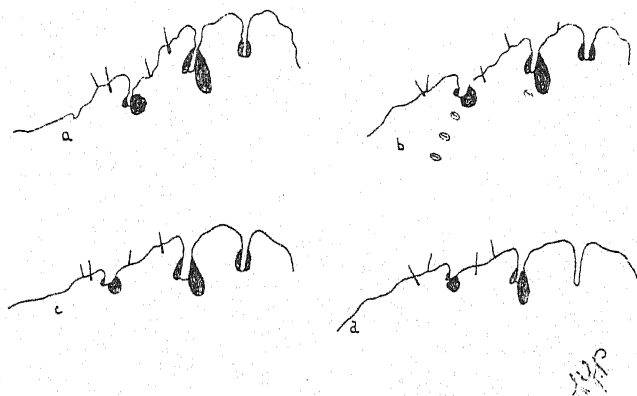


FIG. 10.—Variations of characters of females from scales on Juneberry. (Original.)

can only stand as *Fernaldi*, var., for they differ in no tangible character except the rather more numerous glands in the groups." The number of spinnerets for the Juneberry specimens are as follows: median, 2-3; cephalolaterals, 8 to 18; candolaterals, 8 to 13. In exterior appearance the scales resemble the maple specimens, but are not so numerous nor so evenly distributed, being found in small separate clusters. Collected in Manhattan, Kans., July 23, 1898.

A NEW BUTTERFLY FROM UTAH.

BY HENRY SKINNER, PHILADELPHIA, PA.

MELITÆA MARIA, n. sp.—Male: Expands $1\frac{1}{2}$ inches. Upper side. Primaries. The outer margin of the wing has along its edge about eight brick-red spots; internal to these is another row of yellow spots, separated from the former by a very small space. Next comes a row of yellow spots, the first four having an outward curve, and the lower three an inward curve. There then comes a row of quadrate brick-red spots, nearly parallel to the preceding yellow row. At the end of the cell are three yellow quadrate spots. The cell has in it two comparatively large red spots, outlined with black, and having a yellow patch between them and another toward the base. There is also a quadrate yellow spot with concave sides in the space below the third median nerve. The secondaries are marked in a similar manner.

Under side. Primaries. These are light brick-red, with two spots in the cell of the same colour encircled with a black line; beyond the cell are three oblong yellow spots; still further toward the tip are two rows of yellow spots edged with black. The lower half of the wing is immaculate, with the exception of a yellow dot below each median nerve. On the secondaries are about six rows of spots, the rows being alternately red and yellow, narrowly edged by black. The female is somewhat larger and darker in colour, having less yellow on it. This species belongs to the *Anicia* group, but is lighter in colour than the other species, having more yellow spots. The wings are also narrower. The under side is light in colour, similar to *Acastus*. Described from a number of specimens taken at Park City, Utah, June 26th, 1895, by Prof. A. J. Snyder, and named in honour of his wife, who is an ardent collector and student of the Lepidoptera.

A SERIOUS ATTACK ON THE APPLE FRUIT BY ARGYRESTHIA CONJUGELLA (ZELL.) IN EUROPE.

BY ENRIO REUTER, HELSINGFORS, FINLAND.

In the annual reports of the Canadian Experimental Farms for 1896 and 1897, Dr. James Fletcher describes a new apple-fruit pest in British Columbia, caused by the attacks of small caterpillars, viz., the larvæ of a little tineid moth, *Argyresthia conjugella*, Zell. The injuries done by this new enemy, called by Mr. Fletcher "the apple-fruit miner," closely resemble those caused by the apple maggot, *Trypeta pomonella*, Walsh.

The caterpillars tunnel the pulp of the fruit in every direction, leaving brown-coloured channels with rather large chambers here and there; this attack thus being easily distinguishable from that of the common codling worm.

According to Mr. Fletcher, this apple pest has not previously been noticed in America, and Lord Walsingham, of Thetford, England, that well-known microlepidopterologist, to whom a specimen was sent for determination, states that *Argyresthia conjugella* in Europe feeds on the fruit of *Pirus* (*Sorbus*) *aucuparia*, but has not been recorded from *Pirus malus*. At least no injury of this insect on apples has, as far as I know, until now been observed in Europe.

Last summer, however, an apple pest, quite similar to that described by Dr. Fletcher, has been injuriously abundant in Finland, the apple fruits in almost every orchard having been very seriously injured by small caterpillars and often completely spoiled for use. There can be little doubt that these caterpillars are the larvæ of *Argyresthia conjugella*, one of our commonest tineids.

The unexpected and violent attack of an insect, not previously known in Finland as an enemy to the apple fruit, is peculiar enough, but I think it will be a matter of still greater interest, since we may be able to point out the cause of this phenomenon.

The caterpillar, as stated above, ordinarily feeds in our country on the fruits of the Mountain Ash (*Sorbus aucuparia*), and sometimes also on those of the Bird Cherry (*Prunus padus*). In 1896 and 1897, especially in the latter year, the Mountain Ashes bore fruits in uncommonly great abundance, which was an extraordinarily great advantage for the multiplying of the insect. But this summer the fructification of the Mountain Ash, as well as of the Bird Cherry, almost *totally failed throughout Finland*. *The insect could not find its ordinary food, it must try to obtain another, and the egg-laying moths, swarming in immense numbers, instinctively flew to the apple trees to lay their eggs.*

In a letter recently received, Dr. Fletcher informs me that this insect during the past season was again very destructive to fruits in British Columbia, and, although he could not confirm it, he was told that the prunes were attacked as well as the apples. If this were really the case, the fact stated above, that the larvæ attack also the Bird Cherries, seems to be of considerable interest.

Prof. M. Matsumura, of Sappora, Japan, has described¹ an injury to apples caused by another little tineid belonging to the family *Laverniæ*, and probably to the species *Laverna herellera*, Dup. In a footnote Dr. L. O. Howard² suggests that this insect may be identical with *Argyresthia conjugella*, and that the Japanese insect has been introduced into British Columbia. To judge from the figures, drawn by Prof. Matsumura, of this Japanese insect, and especially of an apple infested by it, and considering, further, the description given by the same author, the Japanese insect certainly does not seem to be identical with our Finnish *Argyresthia conjugella*. The injury caused by *Argyresthia conjugella* on the apple fruits, as described above, is, in fact, quite different to that of the Japanese insect. Dr. Fletcher also points out in his letter that the figure given of the Japanese insect and the description of its work do not quite agree with the Canadian *Argyresthia*.

The injury of *Argyresthia conjugella* is, indeed, a very characteristic one. As this apple pest appears in quite a similar manner in two countries geographically so widely separated as British Columbia and Finland, and as, further, both these attacks are of quite a different nature from that caused by the Japanese insect, we must conclude that the Japanese pest is not identical with that occurring in Canada and Finland.

THE BITE OF OTIORHYNCHUS OVATUS.

BY JAMES FLETCHER, OTTAWA.

Otiorhynchus ovatus is an insect which, during the last decade, has become decidedly more numerous in Canada than was formerly the case. Little seems to be known about its habits. It has been sent to me occasionally with complaints of its attacks upon various crops. Among these may be mentioned injuries to the growing stems of potatoes, and also injuries to fruit in the fruiterer's shop. The beetles have been also sent in frequently as having been found in considerable numbers huddled together in dwelling houses late in the autumn. Perhaps the most interesting complaint which has been made comes from Prof. W. L. Goodwin, of Queen's University, Kingston, who writes: "I send two specimens of a small beetle which caused so much annoyance in camps on Wolf Island, in the St. Lawrence, near Kingston, Ontario, in July last. It attacked us at night and bit with unpleasant severity." Upon writing to Prof.

1. M. Matsumura. Two Japanese insects injurious to fruits in: Bull. No. 10, new series, U. S. Dep. of Agric., Div. of Entom., Washington, 1898, p. 36-38.

2. Loc. cit., p. 37.

Goodwin for exact particulars, and to the suggestion that he might possibly have been mistaken as to the identity of this nocturnal assailant, the following letter was received :

"As to our experience of last summer, there can be no question as to the guilt of *Otiorynchus*. I was awakened several times by the pain of the bite, and caught the culprit red-handed, and having crushed him safely to destroy his powers of locomotion, I laid him in a safe place to identify him the next morning. The bites are very painful, as compared with those of other pests. They itch for a long time, and do not heal sometimes for a week or two. I examined the mouth of our little enemy with a microscope, and concluded that it was a biting mouth and not a piercing mouth. The other members of our camp were also attacked. The beetles were found constantly in our bed clothes, and there can be no doubt, I think, as to this apparently acquired habit."

ON THE RELATIONS OF A SPECIES OF ANT, *LASIUS AMERICANUS*, TO THE PEACH ROOT LOUSE, *APHIS PRUNICOLA*.

BY F. M. WEBSTER, WOOSTER, OHIO.

Some years ago, Dr. Erwin F. Smith* called attention to the fostering of this aphid by a species of ant, *Lasius claviger*, and, although not able to actually witness the act, his studies of the actions of this ant about the roots of peach trees infested by this aphid led him to believe that the former brought the latter from below ground in spring and placed them upon the twigs, thus indirectly if not directly causing their diffusion in orchards.

This *Aphis prunicola* is quite abundant in some localities in Ohio, and I have observed it on the twigs of peach trees as late as early December. Having lately had occasion to study this insect on the roots of young peach trees, I was, equally with Dr. Smith in his previous observations on this aphid, very strongly impressed with the attention given them by ants, in my cases this being *Lasius americanus*, Em.

Not only have I been able to observe the attentions of this ant in caring for the aphid on the roots, but also found them transporting them about on the twigs, and, while I too was unable to witness the actual transportation of the aphid from root to twig, I have no doubt that it is done and also that this transportation is carried on from twig to root. If we examine closely it will be observed that this ant burrows down about

*Entomologica Americana, VI., pp. 101-103 : 201-207, 1890.

the bases of young peach trees from the surface of the ground to the crown, and when the soil is somewhat heavy and packed closely about the base of the tree, these burrows are excavated close to the bark, which is here very soft and tender, and in some cases even the bark itself has been gnawed away, thereby giving the surface an irregularly grooved appearance, but clearly marking the directions of the burrows. This disposes of the question of the ability of this ant to excavate in the tender bark of the roots and about the crown of young peach trees.

Below ground I always find this aphid clustered on the most tender roots or rootlets, as stated by Dr. Smith, and with ants in constant attendance, promptly removing their wards whenever these are brought to light by my digging. But in cases where there was a lack of rootlets, a condition of affairs was encountered that was alike perplexing and interesting. The bases of some of the roots, and also the crown, had patches of bark removed and the wounds had every appearance of having been caused by the gnawing away of the bark, the detached bits intermixed with the escaping sap being present, and the most persistent search failed to reveal any organism capable of doing this, except the ants, of whose ability to gnaw the tender bark of the lower portion of the tree there was ample evidence between the crown and the surface of the ground. The object of these wounds, however, did not appear clear to me until on further examination it was found that where these wounds had begun to heal over, the lips thereof were closely packed with root lice, attended by this ant. It appears that this aphid can subsist from this tender growth of over-healing bark, as well as if they were colonized on the tender rootlets, and in the former case they may be observed collected along the edges of the wound precisely as does *Schizoneura lanigera*, about the overgrowing bark on the apple, in cases of wounds caused by a pruning off of a large limb. Where the wounds on the peach roots were infested by the aphid all bits of gum and detached bark had, seemingly, been removed, thus leaving a clear area for the work of the aphid, and here as elsewhere the ants were carefully looking after them.

When we come to recall the influence of other species of ants, and especially other members of this genus *Lasius*, on other species of aphides, it is impossible for me to escape the conclusion that we here have ample grounds for accusing *Lasius americanus* with intentionally gnawing the bark on the roots in order to furnish a supply of food for *Aphis prunicola*, Kalt., where there is a lack of rootlets for the required pasturage.†

†Read before the Ohio State Academy of Science, December 29, 1898.

A SOUTHERNER ARRESTED IN CANADA.

Towards the end of November last I had occasion—as I so frequently have—to test the patience and endurance of Dr. J. B. Smith, in order to obtain the names of some *Noctuids* taken here last summer; which he promptly determined and returned. In his letter to me accompanying the list of names, he says amongst other matters: “But let me ask of you what do you know concerning No. 11? This is *Acontia aprica*, var. *biplaga*. It is a very common species in Texas and in the South-west generally, and it has been found North as far as Southern Missouri; but I have never seen it any further North or East of that. Is there any chance of a mistake in the locality? This northward extension, if actual, would prove very interesting; but I must confess I am distinctly skeptical,” which under such circumstances he was quite justified in being, and in requiring proof of its right to bear the London label. There are in Ontario two species of this somewhat extensive genus *Acontia*, (*Tarache*) *erastroides* and *candefacta*, which are present every season and nowise rare; but I have never heard of any other species of the genus as having been taken in it.

My evidence to the genuineness of the capture here is that Mr. Bice was at the time I got it constantly going the rounds of his daily occupation, and that he is not in communication about insects with anyone outside the city to get it from abroad. I saw him turn it with other things out of his cyanide bottle, which he told me were taken in a closed globe; that is, one closed at the bottom, where small specimens get quickly dried up, and have to be relaxed before they can be pinned with safety. I secured it there and then; relaxed it, pinned and spread it with special pleasure, because it was to me such a novel and attractive specimen. Dr. Smith acknowledged my answer to his question and considered the evidence satisfactory.

Such a find as that is well calculated to throw theories of distribution and exactly laid out Faunal Zones into confusion; but these, like all other human systems, are rigid things in comparison with nature's elastic methods of dividing up the surface of the globe to best suit its own interests. Life in nature rebels against being hedged in by lines of latitude and longitude, and insect life particularly. Many interesting questions are started by such a departure from the ordinary routine of human observation and experience. Missouri is a long way from here. Did that specimen come direct from there to here? It seems very

unlikely. Did it get here by shortened stages and lengthened time through several generations? That starts the question of food plant, what it is, and can it be obtained between there and here? Latitude might thus arrest its progress, at least its permanent progression that way. I have often wondered why insects, which I have every reason to believe were in a locality, could not be got; and am impressed with the idea that there must be many in a locality where one is got, and that some may be in localities where none have yet been seen; and when one is taken in such localities we are apt to conclude that it is the only one that ever was there.

It was in the autumn of 1881 that I took my first specimen of *Heliothis armiger* at Hamilton. An. Rep. Ent. Soc. of Ont., 1881, p. 30. And Dr. Saunders, then of London, now of Ottawa, assured me that up to that time he had not taken it. It was considered then to be but a transient visitor; now it could be taken here in numbers every season, although reported as injuring corn for the first time last season—a good illustration of how a migrant establishes itself in a new locality where its favorite food plant is easily obtainable. And others may be doing the same, of whose presence we have as yet had no indication.

The other species new to the Society's collection of that sending were:

Bryophila teratophora, H. S.

Manestra anguina, Grote.

Schinia trifascia, Hub.

Galgula subpartita, Guen.

J. ALSTON MOFFAT, London, Ont.

As a postscript to the above, I will now notice another of Mr. Bice's rare finds. Amongst the *Hydracia* sent to me by Mr. H. Bird, Rye, N. Y., was a handsome specimen of *H. Necopina*, Grote, which Mr. Bird said was considered by many to be a mythical species until he discovered its food plant, and secured it in sufficient numbers to distribute freely. Mr. Bice called and saw the specimens; looked at them long and intently; pondered much, but said little. He went home and turned over his more recent captures, called a few days later with a box in his hand, which I took and opened; and there, to my surprise and delight, was a *Necopina*; lacking the lustre of the other, but quite unmistakable. Mr. Bird's specimen recalled something he remembered taking, but said nothing about it until he should see, for fear he might be mistaken.

J. A. M.

NOTES ON THE AMERICAN FORMS OF EUCHLOE, HÜBN.

BY A. G. BUTLER, PH. D., BRITISH MUSEUM, LONDON, ENGLAND.

Dr. Beutenmüller, in his recent revision of the species of *Euchloe*, notes the fact that the neururation of this genus is variable, but he appears not to have been aware that the variation is so frequent that no division of the genus based thereupon has any value. In his three groups, *Euchloe*, *Midea* and *Anthocharis*, there are not only species differing in the number of veins in the primaries, but individuals of the same species differ in the same way.

Another point in Dr. Beutenmüller's definition of his groups requires consideration: he speaks of vein 9 as being present or absent, whereas a careful examination of the position of the veins must make it evident that vein 9 is never absent, but that veins 7 and 8 frequently coalesce or are conterminous. This is quite certain, from the fact that in all species which normally possess 11 veins only in the primaries, the twelfth vein occurs abnormally as a furcation of vein 7: thus, in *Midea lanceolata*, which usually has only eleven veins, vein 7 is sometimes forked near the distal extremity, though with a shorter fork than is usually seen in *Euchloe Sara*; nevertheless, some examples of the latter, and particularly in the smaller varieties, *E. Reakintii* and *Julia*, have only 11 veins.

Dr. Beutenmüller places *E. pima* and *E. methura* under *Midea*, although, excepting in the absence of the fork to vein 7 (or, in other words, in the absence of vein 8), they agree far more closely with the species of *Zegris*.

Some of the white species of *Euchloe* have 11 and others have 12 veins to the primaries, whilst the second subcostal branch (vein 10) varies considerably in its position in the same species, being emitted before, at or after the end of the discoidal cell.

As regards *E. creusa*, I believe it to vary seasonally as much as its very close ally, *E. ausonia*; the attempt to distinguish between *E. ausonides* and *E. hyantis* looks to me like a failure, not that they cannot be readily distinguished by size, form of secondaries, depth of ground-tint, and size of white spots on under surface, but because these differences are also to be seen in undoubted seasonal variations of the European form, *E. ausonia*, and because if *E. ausonides* is distinct from *E. hyantis*, the Vancouver form, which differs in the pattern of the under surface, has an equal claim to separation. As regards typical *E. creusa*, which Dr. Beutenmüller considers to be *E. hyantis*, I can definitely assure him that the type (which we possess) agrees with his *var. elsa*.

My idea of this species is that it can be arbitrarily sorted out into seven graded forms: *E. ausonides*, *E. var.* from Vancouver, *E. hyantis*, *E. lotta*, *E. coloradensis*, *E. creusa* = *elsa*.

Euchloe olympia is undoubtedly a species of *Zegris*.

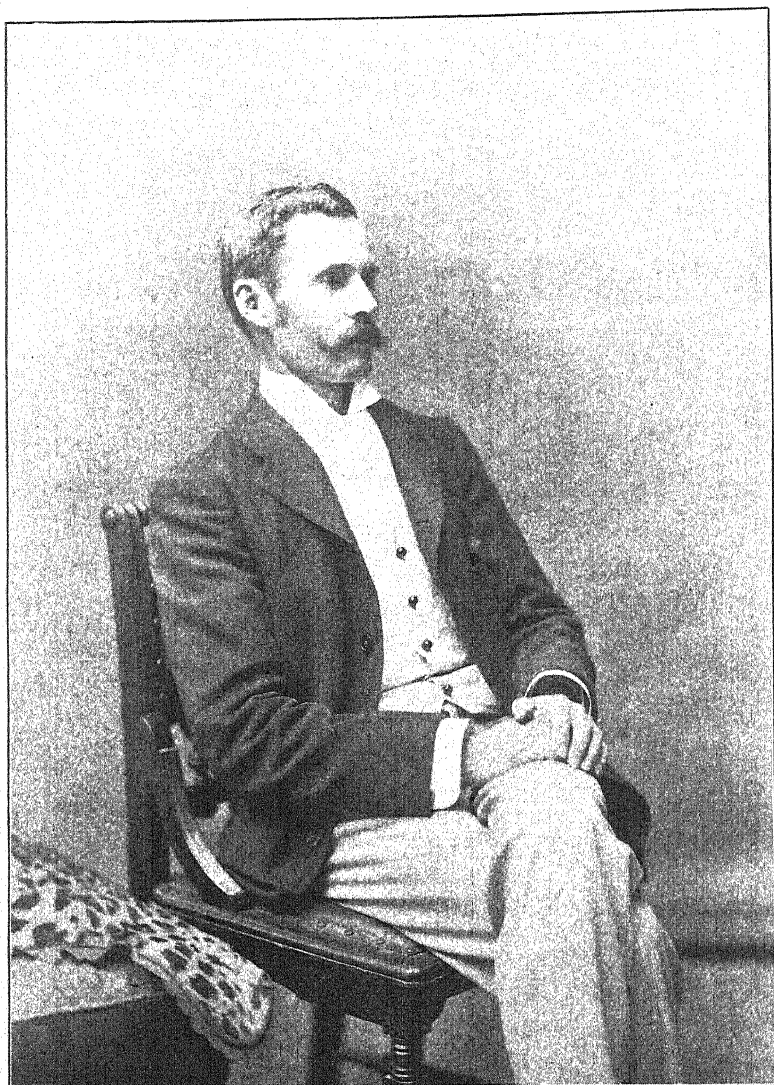
BOOK NOTICE.

THE BUTTERFLY BOOK.—A popular Guide to a knowledge of the Butterflies of North America. By W. J. Holland, D. D., Chancellor of the Western University of Pennsylvania, etc., Pittsburg, Pa.: 1 vol., 4to., pp. 382.

[Price, \$3.00, postage prepaid. Copies may be procured from the author, or William Briggs, 29-33 Richmond Street West, Toronto.]

It is with great pleasure that we announce the publication of this beautiful popular work on the Butterflies of North America. Hitherto the vast number of young people who begin collecting insects have had their enthusiasm sorely chilled by their inability to find names for their specimens, and have in consequence soon given up the pursuit in despair. Now there need be no difficulty as far as the butterflies are concerned. In the handsome volume before us there are no less than forty-eight beautiful coloured plates, produced by a new process from photographic representations of specimens from the author's cabinets, and on them are depicted over a thousand butterflies, belonging to 527 species. The colours are remarkably true to nature, and a child should have no difficulty in identifying any specimen that he may capture from the plates alone. In the letterpress brief descriptions are given, first of the characteristics of the genus in all its stages, with a wood-cut showing the neururation, and then of each species, setting forth the colours and markings, size, etc., of the butterfly, the early stages where known, and the geographical distribution; references are also given to the works of Edwards, Scudder, and other authors, where fuller information can be obtained. As an introduction to the work, illustrated chapters describe in a popular and interesting manner the life-history and anatomy of butterflies, how to capture, prepare and preserve specimens, their classification and the principal books that have been published upon them in North America. Interspersed through the volume are short papers, for the most part of an amusing character, in which the author varies the monotony of descriptive matter by telling some of his experiences or relating some interesting facts regarding these beautiful creatures. We heartily commend the work to our readers, and earnestly hope that it may become widely distributed amongst all lovers of nature throughout North America.

Mailed January 18th, 1899.



WILLIAM HAGUE HARRINGTON, F R. S. C.

PRESIDENT OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO, 1893-5.

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No. 2.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXX. THE LUCANIDÆ OF ONTARIO AND QUEBEC.

This family is of small extent, and the members are as a rule easily recognized by their peculiar habitus. In the genera *Lucanus*, *Dorcus*, *Platycerus* and *Ceruchus* the males are marked by a greater development of the mandibles, associated in turn with a greater or less broadening of the head. The antennæ differ from those of the Scarabæidæ (to which family the Lucanidæ are closely allied) in not having the plates of the club completely opposable. In other words, the club is pectinate rather than lamellate. These organs offer a good character for the division of the family into two divisions—the first containing those genera in which the antennæ are geniculate (*i. e.*, crooked like a bent knee, the second and following joints forming an angle with the first, as shown in the figure of *Lucanus dama*, fig. 12), while the second is composed of those in which they are straight. The male antennæ frequently differ from those of the female, but it is not necessary to enter into details for the purpose of this paper.

So far as known, the larvæ of the North American species are lignivorous, feeding upon dead wood in various stages of decay. They resemble in general form those of the larger Scarabæidæ, and may often be seen under logs in the woods. Some of them construct a cocoon of chips before passing into the pupal state. (Fig. 11 represents the larva and cocoon of *Lucanus dama*.)

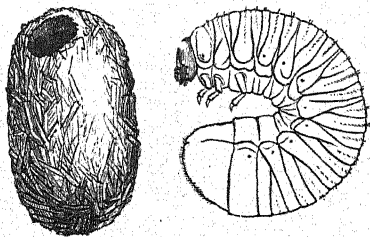


FIG. 11.

The genera found in our region may be separated by the following table, which is but slightly changed from that of Mr. Chas. Fuchs in his synopsis of the family :

- A. Antennæ geniculate.
- b. Elytra smooth or nearly so.....*Lucanus*.
 - bb. Elytra striate and punctate (obsoletely in one case).
 - c. Eyes strongly notched by the margin of the head.
Larger species.....*Dorcus*.
 - cc. Eyes entire or nearly so.....*Platycerus*.
- AA Antennæ straight (*i. e.*, not geniculate).
- Smaller species. Front of head simply excavated or with a depression.....*Ceruchus*.
 - Larger species. Front of head with a short bent horn, pointing forward.....*Passalus*.

Further remarks on structural characters will be found under the head of each genus. The specific differences indicated are in the main those used by Mr. Fuchs in the paper above mentioned. *Nicagus* is omitted, for though the genus is now included in the Lucanidæ, the single Canadian species, *N. obscurus*, was treated of under the Scarabæidæ in CAN. ENT., Vol. XXVI., p. 206. It is entirely different in appearance from the other Canadian Lucanids, looking, as Dr. Leconte has said, like some of the Sericæ or a nearly smooth *Trox*.

LUCANUS, Linn.

Contains two Canadian species. They are large brownish beetles of shining surface, with very prominent mandibles, which are most strongly developed in the males. The tibiæ are armed externally with large teeth, but are without the finer serrations seen in the following genus.

Femora yellowish or very light brown.

Mandibles with but one tooth internally.

Head of well-developed male broader than prothorax. .92-1.40 in....*dama*, Thunb.

Femora dark brown or nearly black, not lighter than the rest of the leg. Mandibles straighter, with several teeth in the male, two ill-defined ones in the female. Head narrower than prothorax. Punctuation of upper surface of body better defined than in the preceding .96-1.40 in.....*placidus*, Say.

Fig. 12 represents *L. dama*.

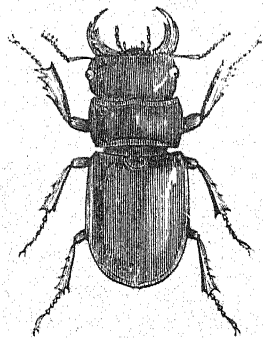


FIG. 12.

DORCUS, MacL.

Somewhat like *Lucanus*, but the species are rather smaller, and the teeth on the front tibiae are less pronounced, becoming mere serrations on the proximal portion. *D. parallelus*, Say, is dark brown, nearly black, the head and thorax shining, with fine sparse punctures. Elytra distinctly striate, the striae and interstitial spaces both evidently and rather closely punctured. In the males the head is nearly as broad as the thorax, and the mandibles have an enormous median tooth, which points obliquely inward and upward. Length, .60-1.04 in. The form called *brevis*, Say (fig. 13, after Packard), is smoother, and the head and thorax are much more developed. This variety is rare, and I have never seen it.

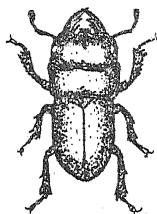


FIG. 13.

PLATYCERUS, Geoff.

These are much smaller insects than those belonging to the foregoing genera. The eyes are nearly entire instead of being notched in front by the encroachment of the sharp side margin of the head, and the anterior tibiae are armed externally with numerous fine sawlike teeth. The mandibles of the males have an upward inclination and are larger than those of the females.

Sides of prothorax rounded, hind angles rather obtuse or rounded.

Brownish, greenish or bluish, shining, elytral striae less deep.

.40-.48 in. *quercus*, Web.

Sides of prothorax quite distinctly angulate near the middle, hind angles rectangular, distinct. Blackish, often with slight metallic reflections. Elytral striae deeper, surface less shining. .44-.53 in. *depressus*, Lec.

In the Pacific provinces other species are found. *P. oregonensis*, Westw., is known from Vancouver Island. It is of a bluish colour, and looks something like *depressus* as far as form is concerned, but may be at once distinguished from that species by having the sides of the thorax straighter in the male and the hind angles obtuse or indistinct. It is of the same size as *depressus*. *P. Keeni*, Casey, from the Queen Charlotte Islands, was described in the CAN. ENT., Vol. XXVII, p. 153, so it is not worth while to repeat the characters here. It is .50 inch long, stouter than *oregonensis*, the elytra subcostulate and the legs very thick. The type was of a blackish-castaneous colour,

CERUCHUS, MacL.

C. piceus, Web., is the only representative in the east, but two others occur in the Pacific provinces, so that they are all included in the table. They are more convex insects than *Platycerus*, highly polished and shining. In colour all are brown. The males have the mandibles highly developed, and with an enormous median internal tooth. The head is also much broader in that sex, and bears a deep frontal excavation.

Elytra striate only on the disk. Striæ fine, intervals very strongly punctate. .52 in. *punctatus*, Lec.

Elytra striate on disk and sides.

Striæ deep, coarsely, strongly punctured. .64-.68 in. *striatus*, Lec.

Striæ shallower, more sparsely and less deeply punctured. (Fig. 14.)

.40-.60 in. *piceus*, Web.

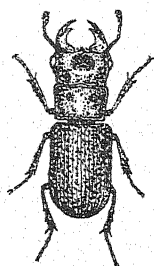


FIG. 14.

Both *punctatus* and *striatus* are known from Vancouver Island, where I got them in 1889. In the same region occurs *Sinodendron rugosum*, Mann., which belongs to the division of the family with straight antennæ, but may at once be distinguished from its neighbors by the fact that the clypeus bears a recurved horn, much longer in the males. In this sex the thorax is higher and sharply declivous anteriorly. The form of body is more cylindrical than any of our other



FIG. 15.

Lucanidæ, while the sculpture is extremely coarse, the thorax being very coarsely confluent punctured, becoming rugose in the females. The elytra are striate, but the lines are fine and almost effaced by large punctures. Length, .44-.72 in. A male is shown in fig. 15.

PASSALUS, Fabr.

This genus is represented only by *Passalus cornutus*, Fabr., which must be rather rare in Canada, though common farther south. It is a very thick-set, heavy, shining brown beetle, 1.24 to 1.64 inch. in length, parallel-sided, the prothorax quadrate, about as broad as the elytra and with a distinct median groove. The head is narrower, without great mandibular development, but bearing a curious horn, which has the tip bent forward. The antennæ are stout, pubescent, and while not geniculate, seem to lie in a curve with the hollow anteriorly so as to give something of the same optical effect. The elytra are deeply striate, the striæ very finely punctured at bottom. A slightly reduced representation is shown by fig. 16.



FIG. 16.

I know of but one paper treating synoptically of the North American species.

1882. Fuchs, Chas. Synopsis of the Lucanidæ of the U. S. Bulletin Brooklyn Ento. Soc., V.

Capt. Thos. L. Casey has described a number of new species of *Platycerus* in various publications, but has not tabulated the genus.

A NEW SPECIES OF *ASTEROSCOPIUS*, Bd.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, N. J.

Lederer characterizes *Asteroscopus* essentially as follows: Narrow-winged owlets, resembling Bombycids in the shaggy, loose vestiture. Palpi short, not exceeding the front, drooping. Tongue short and weak. Eyes naked, with bristly lashes. Antennæ comparatively long, with a tuft of hair at the base; in the male with short pectinations to the tip; in the female with sharp, ciliated angles to each joint. Thorax broad, convex, clothed with long, woolly hair. Abdomen shaggy, untufted. Body beneath and legs with dense woolly vestiture. Legs short, anterior tibia with a long claw at the tip.

The caterpillars are naked, considerably enlarged posteriorly, green, with a pale lateral stripe, and have an abrupt declivity or step on the last segment. They feed on various deciduous trees, and when at rest elevate the anterior segments as do some of the Notodonts. They pupate underground and remain unchanged an unusually long time.

Heretofore no species properly referable to this genus has been described from our fauna. The *A. barometricus* of Goossens, Le Nat. III., 380, is simply a redescription of *Ufeus plicatus*, Grt. Every structural character given by Goossens contradicts the description of the genus to which he refers his species and agrees with those of *Ufeus*.

A species properly referable to this genus was taken by Mr. E. F. Heath, sent to Dr. Dyar for determination, and by him referred to me. I characterize it as follows:

ASTEROSCOPIUS BOREALIS, n. sp.

Ground colour a dark ashen gray, powdered with black, hairlike scales, which gives the insect a sordid, smoky appearance. Head and thorax perhaps a trifle darker than the wings, the head much retracted. Abdomen with somewhat finer vestiture, which show a tendency to a mouse-gray tint. Antennæ of the male yellowish-brown, distinctly but not lengthily pectinated, and with a tuft of creamy hair at the base.

Primaries with all the veins black marked, giving the insect a somewhat strigate appearance. No basal line. T. a. line single, broad, diffuse, outwardly bent so as to form almost a right angle in the submedian interspace. T. p. line single, blackish, shortly dentate on the veins, starting from the costa over the reniform, bent outwardly far beyond the cell, then almost parallel with and rather close to the outer margin, to the inner margin. There is no s. t. line and there are no terminal dots; but the fringes are cut with triangular black dashes, the apices of which rest on the middle of the interspaces. There is a vague series of oval, darker shades in the interspaces beyond the t. p. line. A median blackish shade starts obliquely from the middle of the costa, reaches the median vein at the bottom of the reniform, and is then discontinued. The reniform is large, irregular, of the ground colour, outlined by a diffuse blackish line. Orbicular very long and narrow, decumbent, scarcely defined, reaching from the t. a. line almost to the reniform. Claviform distinct, narrow, extending almost to the middle of the wing, outlined in diffuse blackish.

Secondaries, smoky over whitish, powdery, the apex and margin paler. Fringes whitish. Veins dusky. A series of blackish, somewhat undefined terminal spots in the interspaces. Discal spot of the under side showing through the wing.

Beneath, primaries smoky, powdery, shading to almost white toward the outer margin, which is marked by a broken terminal line and small, interspaceal black dots. The reniform appears here as a darker smoky shading, and the course of the t. p. line is marked by a diffuse smoky shade which disappears before it reaches the inner margin. Secondaries white, shaded with smoky along the costal and inner margins. Veins marked with blackish. A series of smoky terminal spots in the interspaces. A large blackish discal lunule, from which a black line extends to the base through the middle of the median cell.

Expands 2 inches = 50 mm.

Habitat: Cartwright, Manitoba.

A single male specimen, donated by Mr. Heath to the U. S. National Museum, where it is marked Type 4107!

The species should be an easily recognizable one, not only from the generic characters, but from the distinct bombyciform appearance and the quite striking maculation of the under side. The nearest approach to this occurs in *Rancora*, next to which the present genus and species may be placed in the series,

DESCRIPTION OF LARVA OF *INGURA DELINEATA*, GUEN.

BY HARRISON G. DYAR, WASHINGTON, D. C.

I have named my specimens in accordance with the material in the National Museum, arranged by Prof. Smith. The result is unsatisfactory, because this is the gum-tree larva described by Edwards and Elliot as *I. prapilata*, Grt. (Papilio III., 135). The larva mentioned in Guenée as *delineata* has a different food plant. There is evidently some confusion here, which must be adjusted by the next monographer of the genus.

Egg.—Low and flat, domed, like *Apatela*, the edges wavy, thin and flat. Surface smooth, with numerous rows of little elongated beads radiating regularly from the micropyle, reaching the number of about 160 around the margin. The points of increase are not perceptible, as the surface is entirely flat, without ribs, and the beads not contiguous. Transparent, colourless, green from the leaf showing through. Diameter 1.2, height .2 mm.

Stage I.—Head bilobed, long, shining pale brownish; width .3 mm. Body slender, translucent ochreous-yellow; setæ normal, long, stiff, brownish, arising from small rounded brown tubercles. Tubercle iv. is behind the spiracle about equidistant between iii. and v.; vi. not present. Feet normal; no markings.

Stage II.—Head whitish-yellow; width .45 mm. Body slender, anal feet stretched out behind, thorax a little enlarged. Pale yellowish, rather translucent, the food showing green, darkest in the thorax. Skin a little shining, smooth, the segmental incisures of joints 4 to 11 very well marked. Setæ five, rather long; tubercles obsolete.

Stage III.—Head translucent, pale yellow; width .8 mm. Slender, smooth as before, but the incisures of joints 5 to 11 folded and marked in pale yellowish pigment, giving six faint, transverse intersegmental bands. Four tubercles on the anterior edge of cervical shield are minutely black. No other marks. Setæ smaller than before, except at the ends.

Stage IV.—Less slender, thicker and a little flattened, tapering behind; width of head 1.2 mm. Translucent green, head slightly whitish; intersegmental bands supplemented by a broken subdorsal, and continuous, straight stigmatal line, pale yellow, the subdorsal consisting of a dot behind tubercle ii. and a dash below it, distinct except on the thorax. Blood somewhat green; setæ pale; feet slender.

Stage V.—Head dull yellowish, translucent ; width 1.9 mm. Body green, marked with opaque yellow ; twelve short, transverse, intersegmental, dorsal bands, reaching below the level of wart ii., that between joints 13-14 broken into three dots. Many irregular dots, about nine on each side above the straight, narrow superstigmatal line, and nine below it, none on the tubercles, which are concolorous or brownish (iii. to v. are brown) ; four black tubercles on anterior edge of cervical shield. A yellow line on the divergent anal feet. Tubercle iv. at the lower edge of spiracle.

Stage VI.—Head retracted at apex under joint 2 ; dull yellowish ; width 2.5 mm. Body thick and flat, joints 11 to 13 tapering, anal feet outstretched backward, all the feet with long claspers, slender, normal. Yellow-green, clear, but not translucent, the light yellow marks as before, but the dorsal transverse bands shorter (just below tubercle ii.), except the broken one between joints 13 and 14, which almost touches the stigmatal line ; dots more numerous (about 12 to 18 instead of nine in each space), some irregular. No black dots on cervical shield. These have suddenly disappeared ; spiracles brown, just below the narrow superstigmatal line ; cervical shield and anal plate with a yellow edge. Setæ pale, long subventrally ; tubercles obsolete, not coloured, iv. opposite lower edge of spiracle. Feet pale whitish, dorsal vessel dark. Length 23 mm. The larva sits flatly on the back of the leaf.

At the end of this stage the larvæ spun cocoons of white silk between partly bitten up leaves. Imago in about three weeks.

Found on gum tree (*Liquidambar*) at Glendale, L. I.; also at Morris Plains, N. J.

A PROLONGED SEASON OF OCCURRENCE FOR *SCHISTOCERCA AMERICANA*.

At Wooster, Ohio, this species was observed in the fields on May 26, and at Alliance, nearly due east, on October 24, while at Bridgeport, in the extreme eastern central part of the State, it was found, active, on November 4, all during 1898. It appears to have been more numerous of late in the vicinity of the south shore of Lake Erie than elsewhere in the northern portion of the State, and more abundant than I have formerly observed it in the same latitude in Indiana and Illinois.

F. M. WEBSTER.

NOTES ON SOME ONTARIO ACRIDIIDÆ.—PART III.

BY E. M. WALKER, TORONTO.

(Continued from Vol. XXV., page 263.)

IV.—ACRIDIINÆ.

20. *Schistocerca americana*, Drury.

Gryllus americanus, Drury. Illustr. Nat. Hist., app. (1773).

Acridium americanum, Scudd. Mat. Mon. N. A. Orth., 466 (1862).

Schistocerca americana, Blatchley. CAN. ENT., XXIII., 79 (1891).

This large and beautiful locust has been twice reported from Ontario, at London (CAN. ENT., XXVII., p. 52), and at Toronto (CAN. ENT., XXIX., p. 89), a single example being taken in each instance. These were probably wanderers from the South, certainly in the case of the Toronto specimen, and the insect can hardly be regarded as a native of our Province, though it may be established in the extreme southern portion.

21. *Podisma variegata*, Scudder.

Pezotettix glacialis, Comstock. Introd. Ent., 107 (1888).

Podisma variegata, Scudd. Revision of the Melanopli, from Proc. U. S. Nat. Mus., XX., 101 (1897).

I have taken this beautiful little species in two large swamps, one at De Grassi Pt., Lake Simcoe, and the other about six miles further west. Altogether I have taken sixteen specimens, eight ♂s and eight ♀s, six from De Grassi Pt. and ten from the other spot. Dr. Brodie has also taken it at Muskoka, where he found it in considerable numbers. The only other localities where it has been found are Ithaca and Enfield Falls, Tomkins Co., N. Y. (Scudd. Rev. Melanopli, p. 102).

It can be at once distinguished from all our other Acridiidae, except its ally, *P. glacialis*, Scudd., by its having no trace of either tegmina or wings. The latter species, which is not uncommon in the White Mountains, N. H., has been taken at Sudbury, Ont., by Dr. Scudder (Rev. Melanopli, p. 100), but is not found with us at the south, being, like most of the genus, a species which affects high altitudes or latitudes. It differs from *P. variegata* mainly in the shorter hind legs and antennæ, the stouter cerci, and the almost uniformly green hind femora, those of *P. variegata* being pale yellowish, thrice banded with dark brown.

The two swamps where I secured my specimens are quite similar in character. They are for the most part densely wooded with a mixed growth of arbor-vitæ, tamarack, balsam fir, and spruce, with raspberry

bushes, *Eupatorium purpureum* and *perfoliatum*, and many other plants in less abundance growing in the sunny openings. In the wetter parts of the swamps, where tamarack is almost the only tree to be found, I have never seen *P. variegata*, which seems, indeed, to be the most particular about its haunts of any of our Acridians.

They are generally seen sunning themselves on the leaves of shrubs, sometimes close to the ground, though more often three or four feet above it. Most of my specimens were taken from the leaves of the red raspberry (*Rubus strigosus*), one from Labrador Tea (*Ledum grœnlandicum*), others from the branches and trunk of arbor-vitæ (*Thuja occidentalis*). I found a dead and decayed male clinging to a raspberry twig. It had evidently been the victim of some fungus like that which infests the common two-striped locust (*Melanoplus femoratus*).

Besides the mature specimens, I have also a female nymph, which resembles the adult much more closely than do those of *Melanoplus*, the colour and markings being quite similar to those of the adult.

It is a late appearing insect, all but three of my specimens having been taken in September. One of these three, my first capture of the species, is dated Aug. 6, 1895, and the other two Aug. 23, 1867. I do not know how late they remain, as I always leave De Grassi Pt. before the end of September, at the time when they are most easily obtained.

22. *Melanoplus atlantis*, Riley.

Caloptenus atlantis, Riley. Ann. Rep. Ins. Mo., VII., 169 (1875).

Caloptenus atlantis, Thos. Bull. Ill. Mus. Nat. Hist., I., 68 (1876).

Melanoplus atlantis, Scudd. Rep. U. S. Ent. Comm., II., app., 24 (1881).

This is one of our commonest grasshoppers, doubtless occurring in all parts of the Province. It appears earlier than most of our *Melanopli*, and continues until late in the fall. In the season of 1898 I saw a number of adults on June 16th, though they are not usually seen until about a week later. It is to be found mostly on sandy soil, often in immense numbers, and is our most destructive locust.

I have specimens from Rat Portage, Aug. 28, 1897; Nepigon, Aug. 27, 1897; Severn River, Aug. 17, 1898; Lake Simcoe, and Toronto. Along the Severn River they were not nearly so common as one would have expected, from the sandy and rocky character of much of the country, *M. collinus* far exceeding it in numbers.

All my specimens have the typical red hind tibiæ, nor have I ever noticed a specimen with tibiæ glaucous or otherwise differently coloured.

23. *Melanoplus Dawsoni*, Scudder.

Pezotettix Dawsoni, Scudd. Daws. Rep. Geol. and Res. 49th Par., 343, (1875). CAN. ENT., XII., 75 (1880).

Pezotettix tellustris, Scudd. Ann. Rep. Chief Eng., 502 (1876). CAN. ENT., XII., 75 (1880).

Pezotettix abditum, Dodge. CAN. ENT., IX., 113 (1877).

Melanoplus Dawsoni, Scudd. Rev. Melanopli, 227 (1897).

This little species is not uncommon near Toronto in certain parts of High Park and the adjoining country. Here it frequents dry sandy soil, generally somewhat bushy or scrubby, but it also occurs in open sandy fields. I also found it quite common at Macdonald's Falls, Severn River, in a sandy and somewhat hilly district, thinly wooded with oak and white pine, with a scattered undergrowth of blueberry bushes (*Vaccinium*), New Jersey Tea (*Ceanothus americana*), Sweet-fern (*Comptonia asplenifolia*), and many other shrubs; the vegetation closely resembling that of the drier parts of High Park, where *M. Dawsoni* occurs.

Dr. Scudder, who kindly determined this species for me, says he has never before seen a specimen taken east of Iowa and Minnesota. I have also found it very common on the prairies of Manitoba.

The specimens from the Severn were taken on Aug. 25th, 1898, while those from Toronto were all taken during September, as I am always away from the city during the summer months. They remain until the beginning of October.

24. *Melanoplus islandicus*, Blatchley.

Melanoplus islandicus, Blatchley. Psyche, VIII., 196 (1898).

Melanoplus abortivus, E. M. Walker. CAN. ENT., XXX., 90 (1898).

Since my description of this species was published I have taken it in a few new localities which somewhat widen its known range. On July 15, 1898, I found a few specimens in a low, rich wood, a few miles north of Toronto, and on Aug. 8 I found it in a similar wood on the banks of the Severn, near Sparrow Lake, and at several other spots along the river as far as Gloucester Pool, near Georgian Bay. In most of these spots it was met with in moderate numbers, being about as common as it is at Lake Simcoe.

25. *Melanoplus fasciatus*, Walker.

Pezotettix borealis, Scudd. Can. Nat., VII., 286 (1868).

Acridium fasciatum, Barnston. Ms. Walk. Cat. Dermapt. Salt. Brit. Mus., IV., 680 (1870).

Caloptenus fasciatus, Walk. Cat. Dermapt. Salt. Brit. Mus., IV., 680 (1870); CAN. ENT., IV., 30 (1872).

Melanoplus rectus, Scudd. Proc. Bost. Soc. Nat. Hist., XIX., 284 (1878).

Melanoplus fasciatus, Caulfield. Rep. Ent. Soc. Ont., XVIII., 71 (1886).

Pezotettix septentrionalis, Morse. Psyche VII., 53 (1894).

The short-winged form (*curtus*, Scudd.) of this species is tolerably common in Ontario in dry open woods, preferably on sandy or rocky soil. It is frequently associated with *Chloealtis conspersa*, and sometimes with *M. islandicus*, though the latter usually prefers damper, richer, and shadier haunts than *M. fasciatus*. While generally fairly numerous where it occurs, it is never very abundant.

I have a single ♀ of the long-winged form (*volaticus*, Scudd.), taken at De Grassi Pt., and hitherto only known from Michigan.

My specimens, taken between June 24th and Aug. 17 (though they are certainly to be found later than this), are from Toronto and neighboring localities, De Grassi Pt., Stony Lake, Peterborough Co., and various points along the Severn River.

26. *Melanoplus femur-rubrum*, DeGeer.

Acridium femur-rubrum, DeG. Mém. Hist. Ins., III., 498 (1773).

Caloptenus femur-rubrum, Burm. Handb. Entom., II., 638 (1838).

Melanoplus femur-rubrum, Scudd. Hitchc. Rep. Geol. N. H., I., 375 (1874).

This extremely common species occurs throughout the settled parts of Ontario, frequenting every field and roadside during late summer and autumn. It seems to be most abundant in the southern part of the Province, but is plentiful enough in the north in beaver-meadows and wherever there is a rank, luxuriant vegetation. The specimens found in these wild places are apt to be more brightly coloured than those of the fields and roadsides.

They usually make their first appearance with wings towards the end of July, but I have three males from De Grassi Pt. dated July 2, 1896, an unusually early record. They remain later in the fall than any other species, being often seen in sunny, sheltered spots as late as the first week in November.

Melanoplus extremus, Walk., an allied species, will in all probability be met with in Northern Ontario, as it has been reported from most of the Northern United States, from Quebec, and various parts of arctic and sub-arctic Canada.

27. *Melanoplus minor*, Scudder.

Caloptenus minor, Scudd. Proc. Bost. Soc. Nat. Hist., XVII., 478 (1875).

Melanoplus minor, Scudd. Cent. Orth., 84 (1879).

I have found this insect in considerable numbers in the sandy tract of land between Toronto and the Humber River. It frequents dry grassy fields and sandy, bushy or thinly-wooded country.

In most of the specimens from this locality the hind tibiae are bluish-green, though they may vary from a "robin's egg" blue to almost colourless or pale pink. Males with pink tibiae are seldom seen, these being nearly always bluish-green or blue, or sometimes nearly colourless. Of the females, about 25% have pink tibiae, and in about as many they are glaucous or grayish.

The adults appear much earlier than any other species of *Melanoplus* found in Ontario, usually in early June. I took several ♂'s on the 30th of May, 1896; but these were all rather soft, evidently having been full-fledged but a short time. I have never remained in the city long enough in the summer months to ascertain how long in the season they remain, the latest date upon which I have taken a specimen being July 21, when they were still fresh and moderately plentiful.

28. *Melanoplus collinus*, Scudder.

Melanoplus collinus, Scudd. Proc. Bost. Soc. Nat. Hist., XIX., 285 (1878).

This dark-coloured locust is quite plentiful in Ontario in late summer, although this is the first time it has been recorded from Canada.

It frequents sandy or gravelly uplands, more or less open, or rocky, unsettled country, such as characterizes the Laurentian area in Ontario. During August, 1898, I found this locust extremely common along the Severn River, which flows from Lake Couchiching, at the north end of Lake Simcoe, to Georgian Bay through a somewhat hilly region of gneiss and granite, near the southern boundary of the Laurentian area. Here it was decidedly the most abundant grasshopper, far outnumbering any other *Melanoplus*, and flew about the rocks and scanty soil in large numbers. The specimens seen in this locality showed a wider range of

colour variation than those found in the fields and pastures about Toronto and De Grassi Pt. In some the contrast between the light and dark marking is very great, in others the colours are almost suffused with blackish.

This species is common, locally, at Toronto and Lake Simcoe, but is less so than on the Severn River. I have also taken a male at Hawk Lake, on the C. P. R., north of Lake Superior. In this specimen the contrast in the markings is as great as in any specimen I have seen. This latter locality is the most northern from which it has been recorded.

This is one of our late-appearing species, not usually being seen before August. I have one ♀, however, taken July 2nd, 1896, more than a month earlier than it is usually seen. My other specimens are dated from Aug. 11 to Sept. 28, though it can be taken several weeks later than this.

29. *Melanoplus femoratus*, Burmeister.

Caloptenus femoratus, Burm. Handb. Ent., II., 638 (1838).

Acridium flavo-vittatum, Harr. Ins. Inj. Veg., 140 (1841-42).

Caloptenus bivittatus, Uhler (pars). Say. Ent. N. A., ed. Lec., II., 238 (1859).

Melanoplus bivittatus, Scudd. (pars). Hitchc. Rep. Geol. N. H., I., 376 (1874).

Melanoplus bivittatus, var. *femoratus*, Morse. List of N. E. Acrid., Psyche, VII., 106 (1894).

Melanoplus femoratus, Scudd. Proc. Bost. Soc. Nat. Hist., XIX., 285 (1878).

This large, robust locust is so well known throughout Ontario that it need only be mentioned. I have found it in every part of Ontario where I have done any collecting. Though often seen on our roadsides, it prefers places where there is an abundance of rank grass and luxuriant vegetation, such as wet meadows and open marshes. I have often found it on old lumber-roads through swampy woods, and in natural openings in them.

My specimens are dated from June 26 to Sept. 28, but I have seen worn specimens in early October.

30. *Melanoplus punctulatus*, Uhler.

Caloptenus punctulatus, Uhler. Ms. Scudd., Bost. Journ. Nat. Hist., VII., 465 (1862).

Caloptenus griseus, Thos. Ann. Rep. U. S. Geol. Surv. Terr., V., 454 (1872); Bruner, CAN. ENT., IX., 144 (1877).

Melanoplus punctulatus, Scudd. Hitchc. Rep. Geol. N. H., I., 376 (1874).

Melanoplus griseus, Blatchley. CAN. ENT., XXIV., 30, 31 (1892).

This interesting species is occasionally met with in Ontario, but is one of our rarest Acridians. During the last four years I have not seen on an average one specimen during a season. During 1892 and 1893 they were more numerous, but since I was not specially interested in Orthoptera at that time, not many were taken. In all I have taken but nine specimens, all of which are females. I think it likely that the species will prove to be commoner when I have ascertained its exact habitat, nearly all my specimens having been taken accidentally. They were mostly found on old wooden fences or tree trunks, on the borders of damp, shady coniferous woods. Two ♀s were taken on tamarack stumps in a swamp at De Grassi Pt. In every instance in which I have taken this insect further search has proved fruitless.

It is a very sluggish insect, with much shorter hind legs than any of our other *Melanopli*, and relies not so much upon these for protection as upon its mottled gray colours, which make it difficult to observe when squatting on an old lichen-covered fence or stump.

My specimens are dated from Aug. 2nd to Oct. 8th. This is the first time this species has been recorded from Canada.

APPENDIX.

Tryxalinae.

5a. *Chloealtis abdominalis*, Thomas.

Chrysocraon abdominalis, Thos. Syn. Acrid, N. A., 74 (1873).

Chloealtis abdominalis, McNeill. Rev. Trux. N. A., in Proc. Davenport Acad. Nat. Sc., VI., 229 (1897).

During my canoe trip down the Severn River last summer I came across quite a number of what I took to be merely large specimens of *Chloealtis conspersa*, Harr. I noticed that the sides of the pronotum of the ♂s were not black like those of the ordinary *conspersa*, but it never occurred to me that it could be anything but a mere colour variation. Unfortunately, though they were not uncommon, only 3 ♂s and 2 ♀s were secured. When I returned to Toronto an examination of these

specimens proved that they were not *conspersa* at all, but agreed exactly with specimens of *C. abdominalis*, which I took during the summer of 1897 at Banff, in the Rocky Mountains, and in the Province of Manitoba, except that the tegmina are a little longer, especially in one of the ♀s, in which they are nearly twice the length of the pronotum, while in the Western specimens they are only very slightly longer than the pronotum. In the other ♀ from the Severn they are only about one-fourth as long again as the pronotum.

C. abdominalis is easily distinguished from *C. conspersa* not only by the greater size and the paler sides of the pronotum in the ♂, but also by the more arcuate lateral carinæ, especially in the ♀. Very few *conspersa* were seen during my canoe trip.

My specimens are dated Aug. 15 and 18, 1898. This is the first time it has been recorded from Canada, and the first time east of Dakota.

Encoptolophus sordidus, Burm.—This species was quite common at Toronto last fall, and during a bicycle trip along the lakeshore I found it gradually increasing in numbers as I rode to Hamilton and Niagara Falls.

Scirtetica marmorata, Harris.—I found this beautiful locust exceedingly numerous last summer all along the Severn River, in many places being even more abundant than *Circotettix verruculatus*. It flies about the bare gneiss and granite rocks and on the dry, scanty soil which partly covers them.

THE ODOUR OF COCCIDÆ.

Prof. Webster's interesting note on p. 4 leads me to offer a few remarks. The species of the sub-genus *Toumeyella* of *Lecanium* have quite a strong musky odour; but ordinarily I have been unable to detect any marked odour in species of Coccidæ. I suppose, however, that all possess some odour, and that its purpose is to attract the males to the females. This seems the more probable when we remember that in many species the male puparia are not on the same part of the plant as the females. Here at Mesilla Park, also, I have lately seen a male of *Margarodes hiemalis*, Ckll. ined., run over the ground until it detected a spot where a female was buried, and then dig down to the female. It must certainly have detected its mate by the sense of smell.

T. D. A. COCKERELL.

COLLECTING NOTES ON KANSAS COLEOPTERA.

BY W. KNAUS, MCPHERSON, KS.

An experience of eighteen years in collecting Coleoptera in Kansas would naturally lead to the discovery of several good collecting grounds, and to many interesting observations on the abundance or scarcity of certain species for one or more years.

I have found my most interesting and profitable ground on the salt marshes or flats of Wilson County in South-eastern Kansas, and Republic and Mitchell Counties in North Central Kansas; in the valleys of the Verdigris River in Wilson County, of the Republican River in Jewell County, the Smoky Hill River in Wallace County, and the Arkansas River in Hamilton County; the two latter in extreme western Kansas.

I have also collected for years at the electric lights at McPherson. Another most interesting and profitable locality is in the sand hills twenty miles south-west of McPherson. In these sand hills I have taken during the past eight years *Cicindela scutellaris*, *formosa* and *venusta*, all beautiful species; *Stephanucha pilipennis*, Kraatz, one of the rarest Scarabeids; *Serica curvata*, Lec.; *Canthon nigricornis*, Say; *Ammodonus fossor*, Lec., and *Chalcodermus collaris*, Horn. I took from the electric lights last season for the first time a few specimens of *Stenomorphus rufipes*, Lec., a south-western species, but never recorded as taken in this State. McPherson is probably near its northern limit. I also took at the electric lights in June of last year for the first time, four specimens of *Lachnosterna spreta*, Lec., the first capture of this species in this State. Another rare species taken at the lights was *Lachnosterna Ulkei*, Smith, but only two or three specimens were captured. *Lachnosterna bipartita*, Horn, was taken in considerable numbers, both at the lights and in early evening flight. Another beetle taken sparingly at the electric lights in May and June was *Nothopus zabroides*, Lec.; this place is probably near its south-east limit. *Platynus Texanus*, Lec., also occurred sparingly at the lights for the past two years. Each year a few of the handsome *Eretes sticticus*, Linn., are also taken from the electric-light globes.

One of my most interesting collecting grounds is at the range of sand hills parallel to the Arkansas River in Reno County, and about eight miles north of the river. These hills or dunes are blown about by the wind, and in many places are excavated by the air currents to a depth of seventy-five to one hundred and fifty feet, and the fine white sand is

piled in huge dunes, usually north of the excavation. Visits to this region are made in May and June, and are usually well rewarded. The season of 1896 I took *Cicindela scutellaris*, Say, and *Cicindela formosa*, Say, in numbers, the former species being more abundant. I also take the beautiful *Cicindela venusta*, Lec., with the two preceding species, but less abundant; some seasons only a few specimens are taken.

Beginning with the collecting season of 1891, I have each year taken a few specimens, never more than six or eight in a season, of the rare *Stephanucha pilipennis*, Kraatz, first described in 1888 from Nebraska. I have taken it only from May 1st to May 20th, crawling sluggishly over the sand, and have found occasionally dead perfect specimens. Warm evenings, during the latter part of April, will probably furnish the best collecting results for this species. Another handsome and desirable insect taken in May and June in this locality is *Cremastochilus nitens*, Lec. During the warmer parts of the day it can be picked up from the bare sand, but during the hottest part of the day it must be handled quickly, as it becomes active and is a quick flier.

One of the best finds, *Ammodoncus fossor*, was made in this locality May 16th, 1897. After collecting over the hills about three hours, I went up the side of the sand hill, about twenty feet from the bottom of a blow-out, and sat down to eat a lunch. I soon saw a small round *Tenebrionid* running over the sand, and captured it. It was difficult to see, as it was almost the exact colour of the sand, and only the closest observation would distinguish it from its surroundings. By digging out depressions left by cattle in passing over the sand, and examining the few plants growing around, I soon took twenty-two specimens from an area of ten feet square. Specimens were sent to Dr. Geo. H. Horn, of Philadelphia, and through his kindness and that of Mr. Chas. Liebeck, were identified as above. The species occurs in sandy locations in Maryland and New York, and in California and Arizona, although the specimens from the extreme west are of a larger size.

In this locality in 1891 I took *Chalcodermus collaris*, Horn, quite abundantly, but have not since seen a single specimen.

The valley of the Smoky Hill River at Wallace, Kansas, within twenty miles of the Colorado line, is an attractive locality for the collector of insects. The clay bluffs south of the Smoky furnish a home and feeding ground for the king of the *Cicindelidae*, *Amblychila cylindriciformis*, Say. Three short visits to this locality in as many years were rewarded

with the capture of a few specimens of this desirable insect. At rare seasons they are quite abundant, but usually only a few can be taken each night. Another desirable beetle I took by beating the willows on the banks of the Smoky was *Poecilnota thureura*, Say. *Calosoma obsoletum*, Say, is found in alfalfa fields and along old roads the latter part of July and during August. Beating thistles near Wallace resulted in the capture of eight or ten specimens of the rare *Clerus cordifer*, Lec. Under old cow chips near the bluffs were taken a number of the curious and sluggish *Ologlyptus anastomosis*, Say; also numbers of *Trimytis pruinosa*, Lec., and a few *Ophyrastes vittatus*, Say, were found under the same shelter.

Almost directly south of Wallace and distant about one hundred miles is Coolidge in the Arkansas Valley. I collected in this locality one day, July 7th, 1897. The general insect fauna is very similar to that at Wallace, although several species occur at Coolidge that are not taken at the former place. In an alfalfa field adjoining the town, from which the hay was being raked, I took a fine series of *Calosoma triste*, Lec. This species is evidently a variable one, as the elytra of one specimen will be almost smooth, while that of the next one taken would approach the sculptured markings of *obsoletum*.

From horse droppings I took a fine lot of *Canthon depressipennis*, Lec., and thistle heads disgorged *Euphoria Kernii*, Hald., and *inda*, Linn., in proportion of two of the latter to one of the former. But one specimen of the black variety of *Kernii* was taken. Beating vegetation alongside small rivulets and depressions in the prairie yielded numerous specimens of *Monoxia consputa*, Lec., and a few *Diabrotica trilineata*, Say. At Garden City, fifty miles east of Coolidge, a few minutes' beating of plants along the roadside yielded numerous specimens of *Copturus adspersus*, Lec.; *Anthonomus squamosus*, Lec., and *Smicronyx vestitus*, Lec.

The Verdigris Valley in Wilson County yielded a number of desirable things to the collector of Coleoptera. April 20th to 30th marks the appearance of *Lachnosterna calceata*, Lec., the most common Scarabeid in that region. In favored localities on still evenings they swarm over the tender shoots of the young oaks. By jarring these, dozens of the insects fall to the ground, and by the use of the lantern are easily picked up and transferred to the cyanide jar. Other *Lachnosternas* occurring at about this time are *Hornii*, Smith; *gibbosa*, Burm.; *crenulata*, Frch.; *vehemens*, Horn, and *crinita*, Burm. At about the same time, upon a

species of dock that grows over bottom land, can be taken numbers of the beautiful *Phytonomus eximius*, Lec. They are very shy and drop quickly to the ground on the first alarm. The open mouth of the cyanide bottle should be under them before the plant is touched. From the opening leaf-buds of the young hickories may be beaten *Conotrachelus nenuphar*, Herbst., and *affinis*, Boh., and the sap from stumps of freshly cut hickory trees attract numbers of *Colastus semitectus*, Say; *Soronia undulata*, Say; *Perthalycra Murrayi*, Horn; *Pocadius helvolus*, Er.; *Cryptarcha concinna*, Mels., and *Bactridium striatum*, Lec. Under stones near the bluffs bordering the valley may be found rather sparingly *Pasimachus californicus*, Chd., and resting under the same shelter an occasional *Diplotaxis corvina*, Lec. While collecting over the tree-covered stony knoll near Benedict, in this County, in September, 1896, I took a single fresh specimen of *Nomaretus cavicollis*, Lec., the only specimen of this beautiful *Carabid* I ever took south of the Kansas River at Manhattan.

Collecting at Salina, Kansas, in 1884 and 1885, yielded a number of species of *Apions*, identified by Mr. H. C. Fall, of Pasadena, California. Among them were *Apion segnipes*, Say, rather common; *attenuatum*, Smith; *griseum*, Smith; and *occidentale*, Fall, MS., occurred rarely, and are all new to the Kansas list. On the Kansas and Nebraska line, near Superior, Nebraska, the latter part of May, in 1895, I took *Apion minor*, Smith; *spinipes*, Fall, MS., and *Nebraskense*, Fall, MS., a few specimens of each. Near Rago, Kingman County, Kansas, August 15th, 1898, I took a half dozen specimens of *Apion modestum*, Smith, a species also new to the list of Kansas Coleoptera. In the same locality I took *Anthonomus moleculus*, Casey; *Orthoris Crotchii*, Lec., and *Pseudobaris farcta*, Lec.

Some seventy-five miles south-west of Rago, at Belvidere, Kansas, I took on August 16th numbers of *Plectrodera scalator*, Say. This handsome borer was easily taken about sunset on the leaves and twigs of young willows and cottonwoods. Other desirable species taken at this locality were *Lappus lividus*, Casey; *Mitostylus tenuis*, Lec.; *Anthonomus tectus*, Lec.; *Coeliodes asper*, Lec.; *Zygogramma disrupta*, Rogers; *Zygogramma heterotheca*, Linell.

Cicindela violacea, Fab., the beautiful blue or green tiger beetle, is taken in May or June in the wooded valleys of Eastern Kansas. I took two or three specimens near Benedict, in Wilson County, South-east Kansas, last season. Have never taken it west of Manhattan, at the junction of Big Blue and Kansas rivers.

DESCRIPTIONS OF SAWFLY LARVÆ.

BY CHESTER YOUNG, ELLENVILLE, N. Y.

Macroxyela ferruginea.—Larva is about 1.5 cm. long and caterpillar-like, green with yellowish-white markings, prolegs on every abdominal segment, anal area smooth and concolorous with the body, antennæ six jointed. Feeds on *Ulmus americana*.

Head green; antennæ green, except three brown distal joints and a brown ring around the middle of the second and third joints; mandibles rufous at the tips; ocelli black. Body green, with the following parts yellowish-white: two dorsal stripes, a substigmatal line extending along the substigmatal fold of skin from the head to about the third or fourth abdominal segment, and the tubercles; a ventral line of pearly white extending from head to 4th abdominal segment. Segments four annulated, with the tubercles on the normal abdominal segments arranged as follows: none on the first annulation, three on the second annulation, four on the third annulation, and three on the fourth annulation. They are arranged in three general transverse rows. The substigmatal fold of skin with many rudimentary tubercles; dorsal tubercles with many and lateral ones with few to no setæ; setæ very short; two conical projections, with many setæ just above the anus. Legs greenish-white, except for basal joint, which is concolorous with the body.

Cocoon a light shell of sand held together by a few strands of silk.

Larvæ sit curled around the young leaves or terminal buds with the front part of their body free. They feed by eating a line across the bunch of leaves, thus truncating them all. A single brood each year, the adults appearing in April. A few days before the appearance of the adult the larva which has lain in the larval state in its cocoon until this time changes to an active pupa, which bursts its cocoon and comes forth without shedding its skin and exists then as an active pupa at the surface of the ground from twenty-four to forty-eight hours. It then sheds its skin and becomes the true imago. These breedings have proven the, hitherto considered, distinct species of *Macroxyela ferruginea* and *Macroxyela infusata* to be identical. The former has consisted of the females, while the latter has consisted of the males. Larvæ enter the ground about June 1st.

Pteronus fulvricus.—Young larva jet black and possessing a lateral row of yellow spots; anal area black.

Intermediate stage has head black and body green with yellow spots and a dorsal band of black; venter light with black tubercles; prolegs

greenish except for black tubercles. The black line on the dorsum grows more and more broken with each moult until it disappears, except for the black of the tubercles.

Full-grown larvæ are about 1.75 cm. in length and caterpillar-like, green with black tubercles and a lateral row of yellow spots, prolegs on abdominal segments 2-7 and 10, anal area like body, black, antennæ wart-like. Feeds on *Salix sericea*.

Head black or dark brown, with the following parts lighter: a small spot on the genæ between the ocelli and the post-clypeus, the antennæ, the labrum, the labium, and the mandibles and maxillæ except for rufous tips. Body green, with the following parts black: a "Y"-shaped sclerite on the venter of the prothorax, two dorsal tubercles and two tubercles just above the base of the leg on the prothorax, five dorsal tubercles and two just above the base of the leg on both the meso- and metathorax, also a slight cloud of black on the caudal annulation of both segments and one on the cephalic annulation of the metathorax, on normal abdominal segments five dorsal tubercles, two just above the base of the proleg and one on the proleg itself, a black dot between each pair of prolegs except the anal pair, a spot at the centre of the anal area, and the tips of the cerci. A yellow spot of more or less quadrate outline on every segment of the body except the last two abdominal segments just caudad of the spiracle. Legs greenish-white except for a black tubercle on the basal joint and rufous claws. Cocoon is about .9 cm. in length, double elliptical and spun of dark brown silk.

Larvæ are gregarious edge-eaters, two brooded, the adults appearing in May and July. Spins cocoon below the surface of the ground.

Phymetocera fumipennis.—Larvæ about 1.25 cm. in length and caterpillar-like, body white above and yellow beneath, tubercles black, head black, prolegs on abdominal segments 2-8 and 10, anal area like the body, antennæ five-jointed. Feeds on *Smilacina racemosa*.

Head dark brown, with the following parts light: the post-clypeus except a spot at the base and one in each depression, the ante-clypeus except a dot in each lateral angle, the labrum at the base, the maxillæ except the tips, a spot on the front at the base of the post-clypeus, and the genæ below a line passing just dorsad of the antennæ. Palpi black except at the joints. Ocelli black.

Body.—Prothorax yellowish, with five black tubercles in a line above the base of the leg. Tubercles simple. Meso- and metathorax white

above and yellow below, with eight black tubercles in a double line above the base of the leg. Metathorax with a black spot on the stigmatal line. Abdomen yellowish below and white above, with eight black tubercles in a double line above the base of the leg on each normal segment. A black spot on the stigmatal line of each segment except the tenth, and a dark clouded area connecting the dots of adjoining segments. Clouded area absent between the dots of the eighth and ninth segments.

Legs gray, with the following parts white: an oblique suture on the first segment, the whole second joint and the third and fourth below.

Remarks.—The larvæ feed on the flowers of the plant, stripping the racemes of the blossoms. In habits they are gregarious, and when the blossoms are consumed the larvæ migrate to the leaves and there complete their development. When feeding on the leaves the larvæ change from the light colour of the time of flower feeding to a dark greenish-slate. This is caused by the food showing through their thin skins. Cocoons are of dark silk, single, and spun beneath the surface of the soil, larvæ entering the ground last of June.

THREE NEW COCCIDÆ FROM BRAZIL.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Icerya (Crypticerya) Hempeli, n. sp.—♀. Exposed on bark, subglobose, much like a very large *I. rosæ*. Length 8, breadth $7\frac{1}{2}$, height $5\frac{1}{3}$ mm.; dark slate-gray, with a thin but rather dense coating of cream-coloured mealy secretion. Subdorsal areas marked by a longitudinal series of small round spots free from secretion. Legs piceous or dark brown.

Boiled in liquor potassæ, stains the liquid bright pink. Antennæ and legs after boiling pale reddish-brown. Antennæ small and short, 9-segmented, formula approximately (219)(345678), the segments bracketed being subequal in length: 1 nearly twice as broad as long; 9 short and broad, inversely heart-shaped. Legs small but stout, femur fully twice as thick as tibia; tarsus not quite half length of tibia; claw large, moderately curved. Skin chitinous, very strongly so at the sides, remaining deep sienna-brown after prolonged boiling. There are numerous small glands, which in the less chitinized parts are situated on chitinous patches, the skin between these patches being free from coloured chitin. Towards the sides these patches coalesce, and the whole surface becomes reddish-brown, with the gland-orifices showing as clear dots. There are also

some larger gland-orifices scattered here and there in this area. The skin, in the places where it is colourless, is minutely granular. In the sublateral ventral regions is a considerable quantity of short, light, reddish-brown hair. I find no compound glands, such as exist in *I. Ewarti*.

Hab.—Campinas, Brazil, May 12, 1898, on *Mimosa* (?). (*A. Hempel*, 215 d.)

Mytilaspis bambusicola, n. sp.—♀. Scale a little over 2 mm. long, very narrow, of uniform width, rather convex, white; with dark sepia-brown exuviae, which are sculptured in a cancellate manner. After boiling in liquor potassæ, the scale dissolves to a milky substance, which consists of fragments of minute moniliform threads.

♀. Greatly elongated; four rounded produced very distinct lobes, all wide apart, the median ones the larger; in the interval between the lobes a short bifid process; immediately laterad of each median lobe a very long gland-hair or squame, nearly twice as long as the lobe; a similar squame a short distance beyond each second lobe, and three more at long intervals on the margin beyond. Beyond the second, third and fourth squame or gland-hair the margin in each case presents two obtuse elevations, not always very distinct. No groups of ventral glands, but many pairs of transversely elongate gland-orifices scattered over the pygidial area. Embryos in ♀ very large.

Hab.—Campinas, Brazil, May 12, 1898. On stem of bamboo, with *Asterolecanium bambusæ*, Boisd. (*A. Hempel*, 215 c.). *M. bambusicola*, by the absence of circumgenital glands, etc., approaches *M. striata*, Maskell. The brief preliminary description published by Green of his *M. elongata* is rather suggestive of our species. Fortunately, I have some *M. elongata* from Mr. Green, found on leaves of *Arundinara*, at Punduloya, Ceylon. The insect is now doubtfully referred by Green to *Chionaspis*, and it may well go there, having a *Diaspis*-like ♂ scale, with a vaguely indicated keel. The ♀ scale will easily be known from *bambusicola* by its light orange-brown exuviae.

The following species of *Mytilaspis* will be published in the *Revista do Museu Paulista* (Brazil), but it is desirable to present an abstract of the characters in an entomological journal:

Mytilaspis argentata, n. sp.—♀ scale about $2\frac{1}{2}$ mm. long, often curved, very narrow—linear, in fact—but covered and broadly margined

with a film of semitransparent silvery secretion, which under the microscope has a reticulated structure, resembling a skeletonized leaf. Scale dark brown, exuviae dull orange. ♂ scale white, the filmy margin broad, so that the scale becomes oval, or sometimes subcircular. The ♂ and ♀ scales congregate in large patches on the leaves, and even the area between them is thinly covered with the silvery secretion.

♀. Very long and narrow, dark red. No groups of circumgenital glands. Four lobes, and many pointed processes of the margin. Embryonic larva with two large figure-of-8 glands in the cephalic region.

Hab.—On leaves of a forest tree, Campinas, Brazil; April, 1898. (*F. Noack.*)

I will take this opportunity to record a new locality and food plant for *Aspidiotus dictyospermi*, Morgan. Dr. F. Noack found it in May, at Campinas, Brazil, on leaves of ivy (*Hedera helix*).

CONTRIBUTIONS TO COCCIDIOLOGY. — I.

BY J. D. TINSLEY, NEW MEXICO AGR. EXPT. STA.

DACTYLOPIUS SORGHIELLUS, Forbes. Syn. *D. Kingii*, Kkll.

Dr. S. A. Forbes has kindly sent me the type material of this species, which I have examined with much interest. The material studied consisted of 4 specimens. As is usual with these subterranean forms the antennae are quite variable, both in the number of segments and their relative length.

Only two of the antennae of the 4 specimens were 8-jointed, the others being 7-jointed, and some plainly aborted. After careful measurement and study, I conclude that the forms described by Cockerell in *Science-Gossip*, Feb., 1897, p. 240, as *D. Kingii*, must be referred to this species.

I have studied quite a number of specimens of subterranean ant's-nest forms collected by Mr. Geo. B. King around Lawrence, Mass., and have called those specimens *D. Kingii* which had an antennal formula of 81237564. Joint 1 is usually appreciably longer than either 2 or 3, although 1, 2 and 3 may be subequal; 7 is sometimes longer than 3, and 6 sometimes longer than 5.

By examining a considerable number of specimens, however, the formula stated above will always be found to stand out quite prominently.

By way of parenthesis let me add here, that no one should undertake to describe the antennal characters of a species of the *Dactylopiinae* from

one or two individuals. The antennæ of all species which I have studied vary greatly both as to the absolute and relative length of the segments. One should measure quite a number, and then select that formula as typical which occurs oftenest. I have on several occasions come very near making serious mistakes by neglecting this; and as a further illustration I might add that Prof. Cockerell's types of both *Ripersia Blanchardii* and *R. flaveola* are specimens with malformed antennæ.

Among the specimens of "*D. Kingii*" from Mass. two forms may be roughly distinguished: one having joint 1 of the antennæ, about 40-50 μ long; and joint 8, 75-80 μ long; the femur, 140-170 μ long and about 80 μ broad. The second form has jt. 1, 50-65 μ long; jt. 8, 90-110 μ long, and the femur 200 μ or more long, and about 80 μ wide.

One would be inclined from their general appearance under the microscope to divide them at least into a species and variety; but some specimens show intermediate characters. The specimens of *D. sorghiellus* from Mr. Forbes belong to the group of the smaller individuals, while Cockerell's type of *D. Kingii* inclines toward the larger. It may be possible at some future time to separate the latter at least as a variety, but I do not feel justified in doing so at present.

Eriococcus Gillettei, n. sp.—Adult ♀. Ovisac pure white, elongate ellipsoidal, 2-3 mm. long. The ovisacs may be crowded together, but each retains its form; *i. e.*, they do not become a confused mass of cotton.

Dead, shriveled, females brownish and scarcely 1 mm. long, mounted they are about 2 mm. long. When cleaned and mounted the dermis is colourless and bears numerous glands and conical spines; the spines, however, are not so large or numerous as in *E. adenostomæ*, Ehrh., the largest being 15 μ long; the glands also seem to predominate over the conical spines, while in *E. adenostomæ* the spines are most numerous; there are also a few large hairs scattered over the dermis. Antennæ 7-jointed, the joints quite variable in both actual and relative lengths, each bearing the usual hairs; joint 1 can seldom be measured; joint 2, 28-31 μ long; joint 3, 45-60 μ long; joint 4, 25-40 μ long; joint 5, 15-25 μ long; joint 6, 20-25 μ long; joint 7, 25-45 μ long. It is almost impossible to give an average formula, but joint 3 is always longest. Legs rather long and slender; femur about 150 μ long by 50 μ wide; tibia 100-110 μ long by 30 μ wide; tarsus 115-135 μ long by 20 μ wide. Digitules of tarsus quite long and knobbed; digitules of claw also quite long and knobbed. Segments of leg with the usual hairs. Anal ring with eight

rather large hairs, 105 μ long. Caudal tubercles well developed, bearing one or two large hairs, several conical spines and a large seta, 140 μ long.

Hab.—On *Juniperus virginiana*, L., at Solida, Colo.; October, 1898. Collected by Prof. C. P. Gillette.

This species, *E. araucariæ*, Mask., and *E. adenostomæ*, Ehrh., resemble each other so closely externally that they cannot be distinguished by their external appearance. *Araucariæ* and *adenostomæ* resemble each other in the spines, but *araucariæ* has the spines rather more conspicuous, especially a row around the margin, which do not clear as easily as the rest, and therefore stand out rather prominently. In *araucariæ* the tibia and tarsus are subequal, while in *Gillettei* the tarsus is distinctly longer than the tibia, in *adenostomæ* they are nearly subequal. The length of the third joint of the antennæ in *Gillettei* is between those of the other two. *Araucariæ* has the caudal lobes distinctly prolonged, while that is not true in either *Gillettei* or *adenostomæ*.

This species seems to be of economic importance, as Prof. Gillette writes: "The little trees from which I took these specimens seemed almost to be dying from the attacks of these insects. At first I thought the trees literally covered with some *chionaspis* on bark and leaf."

EARLY STAGES OF TRIGONOPHORA PERICULOSA, Gn.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

Eggs.—Laid dispersedly on the 11th of August. They were pinkish-white in colour; somewhat flattened; striated, and had cross indentations. They hatched on the 21st of the month.

Newly-hatched larva.—A half-looper; one-tenth of an inch long. Head bilobed, large. General colour a very pale olive-green, with numerous black warts on head and body, and a few white bristles. Mandibles amber-coloured. Feeds on *Plantago major*. Moulded August 28th.

Larva after first moult.—Length a quarter of an inch. Head small, dark brown. Body colour very pale green. Has four sage-green lines down the back, and is dotted with numerous small brown warts, each bearing a single brown hair. Moulded September 4th.

Larva after second moult.—Length half an inch. Head amber-coloured, spotted with brown. Body sage-green above, greenish-white below. The two shades separated by a double line—the upper part

brown, the lower white. Along the back is a chainlike series of angular brown lines forming diamond-shaped divisions. In the hinder angle of each division is a conspicuous white spot. The larva lies hid during the day, and comes out and feeds at night. When disturbed it curls up into a bunch. Moulded September 21st.

Larva after third moult.—Length after moult six-tenths of an inch. Head amber-coloured, slightly greenish; has a few brown markings and a few white hairs. Body colour of larva above rich warm green, with brown markings and a dorsal line of white spots. Spiracular line creamy-white. Under side of larva pale green with reddish-brown spots. The larvæ are hibernating in this stage. There are probably two broods of *T. periculosa* in the year.

BOOK NOTICE.

THE PTEROPHORIDÆ OF NORTH AMERICA.—By C. H. Fernald, A.M., Ph.D. Revised edition, July 30th, 1898. Boston: Wright & Potter Printing Co., 18 Post Office Square. 1 Vol., 800; 84 pp., 9 plates.

Any one who has a copy of Prof. Fernald's Manual of the Crambidæ of North America will hardly need to be told that this later work is exactly what every student or collector of the micro-Lepidoptera wants, and that the way is now made easy for him when he wishes to identify his plume-moths and learn all that is thus far known about the North American species. It is characterized by its author's well-known accuracy and conciseness of statement, and is a complete monograph of the family as far as this continent is concerned. It begins with an historical account of the family in the writings of European entomologists and the more recent publications in America. This is followed by short chapters on the structure, habits, early stages and systematic position of the plume-moths. The body of the work is taken up with descriptions of the genera and species, including very useful synopses in each case. Three of the plates illustrate the external anatomy and the structure of the wings, the remainder depict the genitalia of the species. We miss, however, the exquisite coloured plates that so beautifully illustrated the Crambidæ. We need not say more than that this is a full and entirely satisfactory work on the Pterophoridæ, and that it maintains the high standard of excellence that we now expect in the author's scientific productions.

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A LIST OF MANITOBA MOTHS.—PART II.

BY A. W. HANHAM, WINNIPEG, MAN.

This list was commenced on page 291 of Vol. XXIX. of this magazine. Since then another season has come and gone, and Mr. Heath, of Cartwright, has kindly submitted all his moths to me for names. Some good collecting has also been done by Mr. Marmont, at Rounthwaite. The result is, as will be seen by a perusal of the sub-joined list, a very respectable addition to the Sphingidæ and Bombycidæ of this Province.

Collections made by Mr. Criddle, at Douglas, and Mr. Hutchinson, at Kinosota, have not been seen yet; they no doubt will yield some new or rare species, especially as both localities should be good ones. At Douglas there is a very large spruce and tamarac swamp, and Kinosota is close to Lake Manitoba, and has besides extensive forest lands in the district.

For collecting at light, the past season (1898) does not compare with the previous one. There were fewer good evenings, and never were insects (mosquitoes excepted) in the same abundance. An early beginning was made, however (April 14th), and in May, especially, a number of fine species showed themselves. The Cartwright records are Mr. E. F. Heath's captures, and the Rounthwaite ones Mr. L. E. Marmont's. Cartwright is in southern Manitoba, close to the border, and Rounthwaite lies about fifteen miles south-west of Brandon, almost at the foot of the Brandon Hills. Both appear to be "A.1" localities for the lepidopterist.

It is owing to the continued kindness and assistance of Dr. H. G. Dyar that I am able to make this list complete up to date. All my new insects, as well as those from Rounthwaite and Cartwright, have been referred to him.

Hemaris rubens, *Hy. Edw.*—Plentiful around "thorn" bloom in open woods on May 24th, and easily netted; a few *H. ruficaudis*, *Kirby*, were out with them, but they were very wild and every one was missed. Also from Rounthwaite and Brandon.

Lepisesia flavofasciata, *Barnst.*—One at Rounthwaite in May. The moth was not sent away, but Dr. Dyar kindly sent a description, by which it was identified.

Ampelophaga chœrilus, *Cram.*—Cartwright.

Triptogon modesta, var. *occidentalis*, *Hy. Edw.*—Cartwright, Douglas, and Rounthwaite.

Smerinthus cerisyi, *Kirby.*—At light, May 17th, 20th, and 23rd (four specimens altogether). Also from Cartwright and Rounthwaite. *Geminatus* was common on above dates, and came to light again on July 13th and 22nd, when, however, it was not accompanied by *cerisyi*.

(*Paonias myops*, *S. & A.*—My record of this species for Manitoba was confirmed on June 15th, when a beauty came to light and was captured. No others showed up.)

Bembecia marginata, *Harr.*—Cartwright.

Sesia tipuliformis, *Linn.*—July 31st, one at rest on a currant bush on the prairie.

Thyris maculata, *Harr.*—June 19th, two at rest on yellow flowers on the prairie.

Nola fuscata, *Grt.*—July 12th, at light, rare. This species was also taken at light in 1897.

Hypoprepia fucosa, var. *plumbea*, *Hy. Edw.*—July 12th to 22nd, rare at light. Dr. Dyar informs me that *H. miniata*, *Kirby*, is a good species (not a var. of *fucosa*). I have not taken *miniata* in Winnipeg, but Mr. Heath tells me it has always been very plentiful with him at light. My record of this species from Brandon was correct.

Lithosia bicolor, *Grt.*—Aug. 8th, one at light. Also from Cartwright.

Crocota laeta, *Bdv.*—July 12th, a pair at light.

Arctia Williamsii, *Dodge.*—From Cartwright and Rounthwaite. According to Dr. Dyar, a good thing, and quite unexpected from Manitoba.

Phragmatobia rubricosa, *Harr.*—From Cartwright.

Leucarctia acraea, *Dru.*—From Cartwright and Rounthwaite.

Euchætes oregonensis, *Stretch.*—Single examples at light on June 17th and 23rd. Also from Cartwright.

Halisidota tessellata, *S. & A.*—July 28th, one at light.

Ichthyura strigosa, *Grt.*—Two at light about the middle of July; also from Rounthwaite. This species may have been more abundant than the record shows, as it was confused with *vau*, which was very common at light.

Gluphisia severa, *Hy. Edw.*—April 25th, one at Rounthwaite. This moth was named by Dr. Dyar from a description which I sent to him.

Notodonta stragula, *Grt.*—May 25th and June 17th, single examples at light.

Notodonta simplaria, *Graef.*—June 17th and July 13th, single examples at light.

Lophodonta georgica, *H.-S.*—A beauty at light on June 19th.

Nerice bidentata, *Walk.*—May 24th and 25th and July 13th, at light.

Schizura leptinoides, *Grt.*—From Cartwright.

Coelodasys apicalis, *G. & R.*—From Cartwright (unique).

Cerura multiscripta, *Riley.*—From Cartwright (unique).

Cerura aquilonaris, *Lint.*—May 17th and 20th, at light.

Prionia bilineata, *Pack.*—From Cartwright.

Hemileuca maia, *Dru.* (?)—A species of *Hemileuca* occurs in Manitoba, but which one has not yet been determined with certainty. On September 6th, 1897, Mr. Boger noticed a number of large moths on the wing in the daytime in the vicinity of the Douglas swamp. Among a lot of paintings of lepidoptera, done by Mr. Criddle, of Douglas, I noticed a *Hemileuca* which seemed pretty close to *Californica*, and from the same paintings Mr. Boger was able to place his day-fliers. Early in July, 1898, Dr. Fletcher found larvæ of a *Hemileuca* feeding on aspen at Bird's Hill, near Winnipeg; these have since produced *H. maia*, var. *lucina*, *H. Edw.*

Clisiocampa disstria, var. *thoracicoides*, *N. & D.*—This form occurred here in July with *disstria*. Both were rare.

Cossus centerensis, *Lint.*—June 12th, one at light, also seen from Cartwright. My capture was in beautiful condition. I found it resting on the window-sill close to my lamp, and it showed no desire to move even when bottled.

Cossus populi, *Walk.* (?)—Dr. Dyar in naming this did so with a query. From Cartwright.

Prionoxystus robiniae, *Pack.*—From Cartwright. Mr. Heath says he got several of these moths from some oak logs used in the construction of his house.

Hepialus mustelinus, *Pack.*—July 18th and 21st. Both specimens taken were fresh. The first was discovered at rest on the wall of my house towards dark, the other was sitting inside one of my open cellar windows. None came to light.

NOTES FOR 1898.

Deilephila gallii was common both at bloom and at light; *lineata* did not show up at all.

Sphinx albescens appears to have been plentiful at Rounthwaite, and a pair of *luscitiosa* were captured there.

Ceratomia undulosa seemed to be not uncommon in Elm Park, at rest on trees, and *Cressonia juglandis* came frequently to light.

Argyrophyes cilicoides turned up again about the same date, and several were taken.

Platartia hyperborea has been taken at Cartwright and Douglas.

Arctia virgo and *Saundersii* were both equally common again at light, and I took several *virguncula* in the same way.

Halisidota maculata came to light several times, and some more were secured from pupæ found under boards in Elm Park.

Tortricidia testacea was one of the most abundant species coming to light, and came in from June 18th to July 13th.

The *Ichthyuras* appeared at light as early as May 13th, and they are apparently double-brooded here. The May lot of *albosigma* were much lighter coloured and handsomer than those taken in July, and among the latter not a single pale one was seen either season.

Schizura ipomææ was not common as in 1897, and not a single *cinereofrons* was taken.

Both *Dryopteris rosea* and *irrorata* were more plentiful than the previous season, and were out for several weeks.

This year I took *Anisota virginiensis* at light, and *Clisiocampa fragilis* was quite common.

Phyllodesma americana came to light on May 17th and 20th, and was not seen later.

(TO BE CONTINUED.)

ACKNOWLEDGMENT.

I desire on behalf of the Entomological Society of Ontario to acknowledge the receipt of some very fine Manitoba Noctuids, from Mr. L. E. Marmont, of Rounthwaite, Man., which are new to the Society's collection. Some of them have only recently received their names, and many of them are particularly attractive species; as *Oncocnemis atrifasciata*, Morr., for instance, which makes this generous donation of Western material a useful and much needed addition to the Society's collection, and therefore more than usually valuable and acceptable. The gratitude of the Society to the considerate donor is specially due.

J. ALSTON MOFFAT, Curator, London, Ont.

NOTES ON ARKANSAS TRUXALINÆ.

BY JEROME MCNEILL, FAYETTEVILLE, ARK.

This subfamily is rather poorly represented in Arkansas, only eight of the thirty-one genera recognized by me as occurring in North America having been found within its borders, and only one genus, *Orphula*, is represented by more than a single species.

Mermiria rostrata, McNeill.—Has not been found in the State, but its occurrence at Mackay, I. T., makes it altogether probable that it belongs to our fauna.

Truxalis brevicornis, Linn.—Occurs in the central part of the State, but has not yet been found in the mountainous Northwest.

Erritettix virgatus, Scudd.—This species must be said to be rare. I have found it nowhere in the State except in a few localities about Fayetteville. It is probably the first Orthopteron which reaches maturity in the spring. As early as April fourth there were no pupæ to be found.

Syrbula admirabilis, Uhler.—This is a southern form, and by far the most common of the Truxalinæ. It is abundant in old pastures. It reaches maturity about the first of July. Brown females are much less common than brown males, but they are not rare.

Chloealtis conspersa, Harr.—An uncommon species, so far as my observation goes. It is represented in my collections from Arkansas by a single pair (male and female) of adult specimens and by three pupæ. These specimens were all taken early in July, and they were always found about the head of wooded ravines in north-west Arkansas. When compared with Illinois specimens these are seen to be larger, the male measuring 25 mm. The female is noticeably different from northern specimens in having the tegmina subacute and the sides of the head, pronotum and abdomen black or very dark fuscous. In the young the antennæ are more distinctly flattened basally than in the adult.

Dichromorpha viridis, Scudd.—This species is widespread, though nowhere abundant, and scarcely common. The brown is about as common as the green variety amongst the females.

Orphula pelidnus, Burm.—This species is the commonest *Orphula* in the State, though it is not abundant or scarcely common in the northwest. In the central and southern parts of the State it is abundant.

Orphula speciosa, Scudd.—This species is much more uncommon than I had formerly supposed. I have found it in a few widely scattered localities only.

Orphula decora, McNeill.—No other specimens have been found since the single one, on which the species is based.

Boopedon auriventris, n. sp.

Vertex prominent, declivent, convex, not separated from the front by distinct carinæ, not forming an angle with the front, but united with it in a curve, as wide between the eyes as the long (female) or short (male) axis of the eye; foveolæ of the vertex entirely wanting (female) or barely discernible (male); foveolæ of the tempora obsolete or represented by punctate areas, plainly visible from above; front moderately inclined, the costa broad, with the sides generally parallel, half as wide as the space between the eyes, convex, suddenly constricted just above the antennæ, vanishing much before the clypeus; antennæ filiform, yellowish at the base, beyond usually much infuscated, longer (female) or much longer (male) than the head and pronotum. Disk of the pronotum subtectiform; posterior margin straight, sides constricted, especially at the first sulcus; median carina strong, percurrent, cut much behind the middle by the principal sulcus; lateral carinæ obsolescent, more distinct in the male, especially on the anterior part of the progone; lateral lobes arcuate dorsoventrally narrow, a little wider (deeper) than long, with the posterior margin perceptibly more oblique than the anterior, the lower margin very obtusely angulate. Space between the mesosternal lobes strongly transverse, that between the metasternal lobes linear, with a deep sulcus on either side (male) or slightly transverse (female), with equally deep sulci. Tegmina not exceeding half the length of the abdomen, ovate, rounded at the tip (male) or subacuminate (female). Posterior femora long, moderately slender, banded above and on both outer and inner surfaces (male) or bands more or less completely obsolete (female). Posterior tibiæ red at least on the distal half, basally frequently lighter, with more or less distinct infuscations near the middle and at the extreme base; apical spines on the inner side very unequal, the longer about equalling in length the terminal joint of the tarsus with its claws. Ovipositor nearly included. Colour very variable, either nearly uniform fuscous-brown or testaceous, with a more or less distinct olive tinge, enlivened with variable fuscous markings; in the lighter specimens there is a fuscous stripe just below and parallel to the tempora, preceded by a light yellow stripe; the sides of the head have a broad fuscous stripe reaching from the upper posterior margin of the eye to the pronotum, broadening rapidly; the lateral lobes of the pronotum are typically infuscated except

for a narrow anterior and a broad posterior band; the abdomen has a series of large quadrate fuscous spots along the sides (female) more or less replaced by bright red (male); the dorsal surface of the abdomen and less frequently the disk of the pronotum and the top of the head are bright yellow or brownish-testaceous; ventral surface of the abdomen more or less distinctly yellow, with the last two segments in the male red. Length: male, 22 mm; female, 38 mm.; tegmina: male, 7 mm; female, $9\frac{1}{2}$ mm.; hind femora: male, $15\frac{1}{2}$ mm.; female, $23\frac{1}{2}$ mm. Fourteen adult males, twenty adult females, seven pupæ, from the summit of Sulphur Springs Mountain, on the line between Boone and Newton counties.

This species is so different in the position of the principal sulcus of the pronotum and in the character of its posterior margins from the other species of *Boopedon* as to perhaps deserve to constitute a genus by itself. Its occurrence is quite remarkable. Sulphur Springs Mountain stands probably as much as a thousand feet above the valley, and with the exception of two or three neighbouring mountains, it decidedly overtops all the surrounding country. This mountain is a high ridge, probably one and a half miles long at the summit. At either end there are considerable prominences, composed of massive millstone grit. One of these is surrounded by cliffs on all sides, so that the top can be reached with some difficulty; the other has the cliffs broken down in places, so that its summit is much more readily accessible. On both of these a tall coarse grass grows luxuriantly, and among this grass this species was found in abundance over the few square yards of the least accessible peaks. A single male was found on the other peak. As several days were spent in collecting in this vicinity, and as particular pains were taken to secure all the specimens possible, and since no other specimens have been found elsewhere, though seven weeks were spent in the summer of 1897 by the writer and a party of three others in collecting in North-western Arkansas, it is reasonable to conclude that this species is an old resident which has inhabited the country since the times when the Ozark plateau was a level plain. As erosion carved out the valleys, the level surface was more and more restricted in areas until at the present time it is represented by the summits of the highest mountains. In this way *auriventris*, which is a grass-loving prairie species, has been hemmed in by the encroaching forests until it now maintains a precarious foothold on a few isolated mountain summits. Under such circumstances wings would be a disadvantage, so they have been shortened by natural selection.

NOTES ON THE AMERICAN FORMS OF EUCHLOE, HUBNER.

BY WILLIAM BEUTENMULLER, CURATOR, DEPARTMENT ENTOMOLOGY,
AM. MUS. NAT. HIST., NEW YORK.

In answer to Dr. Butler's comments (CAN. ENT., XXXI., p. 19) upon my revision of the species of *Euchloë* (Bull. Am. Mus. Nat. Hist., X., pp. 235-248), I could state that Dr. Butler may possibly be right in considering *creusa* (var. *elsa*), *hyantis* and *lotta* seasonal forms of *ausonides*, but with the present knowledge it is not possible to place them so, and for this reason I concluded it would be best to allow the species to remain distinct until more light could be obtained on the subject. At any rate, I was certain that what we had labeled in our collections as *creusa* was not Doubleday and Hewitson's species, which Dr. Butler definitely asserts is my var. *elsa*. What seems to me strange is, how was it that Edwards did not recognize the figure of *creusa*, sent to him by Dr. Butler. *Creusa* (var. *elsa*) cannot be mistaken for either *hyantis* or *lotta* (so-called *creusa*). Doubleday and Hewitson did not give a description of *creusa*, and their figure of the species is unrecognizable, consequently has no scientific value. *E. olympia*, I can assure Dr. Butler, is not a *Zegris*, but belongs with *ausonides*. In the genus *Zegris* the head is very thickly scaled and the palpi are very short, while in *E. olympia* the palpi are long, and in all other respects it agrees with *ausonides* generically. *Cethura* and *pima* do not strictly belong to *Midea* as placed by me. Mr. Grote erected the generic name *Tetracharis* for *cethura* (Proc. Am. Phil. Soc., XXXVII, Jan., 1898, p. 37). In this paper, of which I had no knowledge when writing my own, Mr. Grote referred the American species, with orange blotch in the male, to *Euchloe*, with *cardamines* of Europe as the type, as proposed by Kirby, Scudder, myself and others. He further states that the white species of both continents are slightly more specialized and might be kept under the title of *Anthocharis*, consequently my conclusions, which were worked out independently, are the same as those of my friend Grote. Dr. Butler's remarks about the venation are practically the same as mine, only that he counts the veins differently. Mr. Grote has given excellent figures of the venation of *ausonides*, *cardamines* and *cethura*, to which the reader is referred. Dr. Skinner, in his recent catalogue of North American Rhopalocera, 1898, places *thoosa* as a synonym of *Reakirtii*. I can definitely assert that it is the female of *julia*. He also places *stella* as a synonym of *Reakirtii*, but it is the yellow variety of the latter.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXXI. THE PYTHIDÆ OF ONTARIO AND QUEBEC.

While the Canadian species of this family are not numerous, they are of considerable interest, and, because of the scattered nature of the literature, often quite difficult to identify. The present paper, while containing little that is new, will serve to bring together in concise form the information necessary to enable the beginner to examine his material intelligently.

In the Leconte and Horn "Classification," the following characters are used as defining the family: "Mouth-parts normal, palpi flexible, front and middle tarsi with five, posterior with four joints. Anterior coxal cavities open behind, head not strongly constricted at base, middle coxæ not very prominent. Thorax not margined and without discal basal impressions, antennæ not received in grooves." In appearance, the members differ considerably among themselves, some (for example *Pytho*) being very much flattened, while others (*Lecontia*, *Boros*, *Priognathus*) are much more convex and of elongate form, recalling that of some Trogositidæ. Two genera, *Rhinosimus* and *Salpingus*, contain small species which are sufficiently like some flattened Rhynchitidæ (e. g., *Eugnamptus*) to have led to their being placed in that family by early describers. The table will serve to distinguish them generically:

A. Large or moderate sized. Head not produced into a beak, mandibles visible beyond the labrum.

b. Third joint of antennæ not longer than the fourth.

Head behind the eyes gradually slightly narrower. *Lecontia*.

Head behind the eyes with a distinct though not strong constriction or neck. *Boros*.

bb. Third joint of antennæ distinctly longer than the fourth.

Body very much flattened, depressed, elytra distinctly striate. *Pytho*.

Body subcylindrical, elytra punctured, with only faint indication of striate arrangement. *Priognathus*.

AA. Small. Head produced into a beak, mandibles exposed beyond labrum.

Beak broad and short. *Salpingus*.

Beak prolonged *Rhinosimus*.

The name *Crymodes* has been altered to *Lecontia* in the above

scheme to harmonize with the usage of the latest supplement of the Check-list.

LECONTIA, Champ.

L. discicollis, Lec. (fig. 17), is blackish-piceous; head coarsely closely punctured, usually with a few irregular smooth spaces on the vertical and occipital regions, sides behind the eyes nearly straight, slightly convergent posteriorly. Antennæ short, not reaching middle of thorax, last three joints broader. Prothorax transverse, about one and a half times as broad as long in the best developed specimens, wider than the head, sides nearly or quite straight and parallel from near apex to behind the middle, thence rapidly narrowing to base; surface coarsely, closely but unevenly punctured with irregular smooth spaces on median area and a large illy-defined central discal impression, on each side of which is a rather less evident one. Elytra conjointly a little more than twice as long as their width at base, sides nearly parallel to near the tip. Surface rather shining, densely punctured, with several very slightly elevated costæ. Legs short, concolorous with the body. Length of my specimens varies from 10 to 20 mm. = .40-.80 inch. The small individuals resemble the next species very closely in general outline and appearance, but may be readily separated by the shape of the head behind the eyes. The larger individuals have the above-mentioned specific characters much better developed than have the smaller ones. Beaten from pine trees or found under bark.



FIG. 17.

BOROS, Hbst.

B. unicolor, Say, resembles *L. discicollis* in general form and colour, but is usually much smaller and more shining. The head is much narrower than the prothorax, distinctly constricted behind the eyes. Antennæ short, not reaching back to middle of prothorax, last three joints broader, proportionately more so than in the preceding species. Prothorax, by measurement, just perceptibly broader than long, densely, coarsely and rather regularly punctured; sides regularly rounded, no discal impressions. Elytra elongate, more than two and a half times as long as the breadth at base, sides nearly parallel to near the tip, only slightly broader behind the middle, surface more finely punctured than the thorax, punctuation close, without serial arrangement. Evidences of costæ are very faint. Length, 11-12 mm. = .44-.48 inch. Found under bark.

ПΥΘΟ, Latr.

The species of this genus are commonly found under pine bark or

in lumber piles about sawmills. They recall, in appearance, the Carabidæ, without very closely resembling any of that family with which I am acquainted, though suggesting *Cymindis* or *Helluomorpha*. The table following is that of Dr. Horn. I have used the name *americanus*, though in the Henshaw Supplement it is changed to *planus*, Oliv., while Dr. John Hamilton, in Trans. Am. Ento. Soc., XXI., p. 401, replaces it by *depressus*, Linn. Rather than get our students tangled up with so much shifting, I have adhered to Kirby's designation, *americanus*, by which it has hitherto gone, and which will enable it to be readily placed when the synonymy is finally set at rest.

- A. Base of thorax constricted, forming a collar. Median line of prothorax broad and deep. Brownish, with paler elytra, no metallic lustre. .65 in. *strictus*, Lec.
- AA. Base of thorax not constricted, sides arcuate from front to hind angles. Median line fine.
- b. Colour, when mature, black, shining. Legs black or brown. No metallic lustre.
- Prosternum in front and gula not punctate. .44-.46 in. *niger*, Kirby.
- bb. Colour piceous or castaneous, varying occasionally to rufous, with violet or bluish surface lustre. Legs, antennæ and under side reddish-yellow. Prosternum more or less punctured, gula transversely wrinkled. .45-.60 in. (fig. 18)..... *americanus*, Kirby.

PRIOGNATHUS, Lec.

While agreeing with *Pytho* in having the third antennal joint much longer than the fourth, *P. monilicornis*, Rand., is in form much more like *Lecontia*, but is more convex. A specimen in my collection answers to the following description: Piceous, shining, head narrower than the prothorax, distinctly punctured, the punctures larger and better separated on the median area. Between the antennæ is a deep transverse impression. Eyes small, rounded, prominent, sides of head behind them slightly and regularly convergent. Antennal club gradually formed. Prothorax widest about the middle, broader than the head, sides rounded, strongly and regularly sinuate near the base; punctuation rather coarse, the punctures well separated, not crowded, disk with a large, vague impression



FIG. 18.

on each side near the middle. Elytra elongate, sides subparallel to near the tip, at base broader than the greatest thoracic width, surface coarsely, closely punctured without definite serial arrangement, costæ fine, indefinite, outer elytral margin reflexed, slightly explanate. Legs short, abdomen rather finely and very clearly punctured. Length, .34 in. Found under logs in coniferous forests.

SALPINGUS, Gyll.

S. virescens, Lec., resembles somewhat in form an extremely small *Pytho*. It is greenish-black, shining, head with distinct punctures, rather sparsely placed, eyes prominent, antennæ reddish, the last three joints (which form the club) piceous. Prothorax a little broader than the head, widest about one-fourth from apex, thence arcuately narrowing anteriorly, posteriorly somewhat obliquely narrowed to near the hind angles, which are rectangular and distinct. Surface shining, punctures of moderate size but sparsely placed, an illy-defined impression on each side at the broadest part. Elytra at base broader than their junction with the thorax, widening behind the middle, striate, the striæ fine and shallow, with rows of distinct, closely-placed punctures at bottom, interspaces flat. Humeri prominent. Under surface and legs blackish. Length, .10 inch.

RHINOSIMUS, Latr.

The original description of our Canadian species of this genus was drawn up by Mr. Randall, who described *viridieneus* as a species of *Rhynchites*. It does bear some slight resemblance in form to certain flattened Rhynchitidæ, for example the genus *Eugnamptus*, but the correspondence is by no means close. I have none at hand for description, so append Dr. Leconte's diagnosis of *R. nitens*, which is now considered identical with *R. viridieneus*, Rand. Elongate, blackish-green, highly polished, head and rostrum strongly punctured. Beak flat, twice as long as wide, narrowed at middle, wider at tip. Tip and mouth testaceous. Thorax scarcely broader than long, narrowed behind, sides rounded anteriorly, disk coarsely punctured, quadrifoveolate. Elytra about twice as wide as the prothorax, seriatly punctured, alternate interspaces sparsely uniseriately punctate; near the base is a deep arcuate transverse impression. Beneath piceous or piceo-testaceous. Head with large punctures beneath. Length, .15 inch.

I have purposely made the descriptions of the species of this family more detailed than most of those treated in foregoing papers, because

of the less-known character of the insects themselves. No complete monograph of the American species has appeared, but some genera have received treatment as cited below :

1868. Geo. H. Horn. New species of Coleoptera from the Pacific District of the U. S. Trans. Am. Ent. Soc., II., p. 136 (Table of *Cononotus*).
 1879. J. L. Leconte. New Coleoptera. North Am. Ento., Vol. I, p. 4 (Table of *Rhinosimus*).
 1888. Geo. H. Horn. Miscellaneous Coleopterous Studies. Trans. Am. Ent. Soc., XV., p. 45 (Table of *Pytho*).

ON THE LARVÆ OF NORTH AMERICAN NOLIDÆ, WITH DESCRIPTIONS OF NEW SPECIES.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Genus ROESELIA, Hübner.

R. triquetrana, Fitch.

The larva lives on witch hazel. See Psyche, VI., 110 (*trinotata*).

R. minna, Butler.

The larva is unknown.

R. sorghiella, Riley.

The larva lives in a web on sorghum. See Psyche VI., 110. It is pale yellowish, a red-brown band along warts i + ii, a paler waved band below wart iii and another just above wart vi; hair short, pale, a few long ones. Feet of joint 7 wanting.

R. melanopa, Zeller.

The larva is unknown.

R. pustulata, Walker.

The larva is unknown.

R. cilioides, Grote.

The larva is unknown.

Genus NOLA, Leach.

N. phylla, Dyar.

Stage III.—Similar to the next; body all pale yellowish, a tiny dot on joint 7; head .4 mm. Previous stages not observed.

Stage IV.—Head pale testaceous, width .8 mm. Body flattened, warts large, in three rows, the fourth concealed, abdominal feet on joints 8 to 10 and 13. Pale greenish, shaded with white and brown, a dorsal brown patch on joint 7; subdorsal region irregularly streaked with brown. Hair short and bristly on the upper two warts, very long from

the lower wart, which is lappet shaped. Hair pale, the warts pale brownish; a faint dark dorsal line.

Stage V.—Head brownish testaceous, width 1.2 mm. Body as before, but browner, the mark on joint 7 smaller; a fainter one on joint 11, double. Third wart produced, its hair long and abundant, warts above with the short hair black tipped. Body pale yellowish, a geminate dorsal band of the ground colour, sides below this all faintly brown mottled except at the extremities; warts whitish with a brown ring at the base.

Stage VI.—Head whitish, mottled with brown on the lobes, jaws black; width 1.8 mm. Dorsum broadly pale cream colour, a dark brown subdorsal band, the pair joined by a transverse band on joints 7 and 11, mottled; subventer pale. Wart iii papillose. Body flattened, squarish. Hair pale, the short ones from the upper two warts brownish, those from the third wart very long.

Cocoon triangular, of little pieces of bark, as usual in the genus.

Food plants oaks of various species. The larvæ rest on the backs of the leaves. Rather common at Bellport, Long Island, N. Y.

N. fuscula, Grote.

The larva is unknown.

N. minuscula, Zeller.

The larva is unknown.

N. ovilla, Grote.

The larva lives on oak, hiding on the bark. See Psyche, VI., 110.

N. cethræ, n. sp.

Very close to *ovilla*, but a bluer gray, less ashen. The brown tufts do not rest on the costa, the lines are narrow and dotted, especially the t.-p.; ground colour uniform, bluish-ashen; thorax concolorous, collar posteriorly banded with brown; abdomen and hind wings paler, the latter with a faint discal dot and lighter towards the base, all as in *ovilla*, from which the only distinct difference is the general colour. Expanse 16.5 mm. One male, three females. Bellport, N. Y.

Types in the U. S. National Museum (Type No. 4112) and in the British Museum.

Egg.—Flattened especially in a large area above, outline circular but distinctly elongate in one diameter; sides 25-ribbed, a waved line on the surface of each rib, with fine parallel cross striæ, making elongate rectangular cells; the flattened vertex is finely reticulate. Dull, translucent, waxy white; size .4 and .5 mm., .3 mm. high. Laid on the backs of the older leaves close to a vein.

Stage I.—Small, rather thick and square, not lively, sitting on the back of the leaf near the edge, out straight. Head .2 mm., all translucent whitish, the food green. Hairs single, the primary ones only present; on the abdomen ii is large and black, alternating, leaning outward on joints 7, 9 and 11, the other hairs pale, iv very long, v shorter and pale. Hair i is shorter than ii, iv and v are approximate, iv scarcely higher than v. On the thorax ia is small, ib large and black; iia and iib close together, iia very small; v is long and vi very small. The hairs are fine, not glandular, slightly spinulose. The skin has fine spinules. No feet on joint 7.

Stage II.—Head .3 mm. wide. All white; body thick, the slender abdominal feet absent on joint 7. Warts in four rows as usual, i and v apparently coalesced completely with ii and iv; hairs short, bristly, brownish, not numerous; warts whitish.

Stage III.—Head .45 mm. As before, all rather opaque white, no marks. Warts small, the hairs bristly, a few long ones at the ends. Thick, flattened, the feet small.

Stage IV.—Head .8 mm. Still all translucent whitish, but the appearance is greenish-gray from the food in the alimentary canal. Warts large, round, iv + v the largest; spiracles brown. Hair pale, the short ones brown tipped, smooth, not spinulose. Dorsal vessel greenish. Length at the end of the stage 5 mm.

Stage V.—Head 1.3 mm. wide, retracted at the apex, white, the mouth brown, a dark gray patch at the apex of each lobe. Three upper rows of warts large, the lower small, the body short and thick. Ground colour translucent white, but shaded around the base of each wart and in irregular dorsal and lateral bands with dark gray; large warts of cervical shield brown behind. Hair short, bristly, with brown tubercles and tips, a few long pale hairs from the extremities and third wart. The body is mostly dark above the spiracles. Later there is a reddish-brown broken subventral shade which also tints the third wart. Marks all diffuse, the appearance gray-brown, lighter subventrally.

Cocoon as usual on a twig, triangular and made of bits of bark.

Food plant *Clethra alnifolia*. Larvæ found in all the swamp lands of Long Island that were searched, Brookhaven, Southaven, Quogue, etc. The larvæ hide, but may be found on dark, damp mornings. Usually they remain white till the last stage, but a few assumed the brown shading in part in the penultimate stage, some even having brown warts at this time.

N. involuta, Dyar.

The larva lives on willow, hiding by day in curled leaves. See Psyche, VI., 248 (§*minuscula*), and Coquillett, Journ. N. Y. Ent. Soc., VI., 249 (§*minuscula*).

N. exposita, Dyar.

The larva lives on willow, feeding exposed. See Psyche, VI., 110 (§*hyemalis*).

N. anfracta, H. Edwards.

The larva is unknown.

Genus MEGANOLA, Dyar.*

M. conspicua, Dyar.

The larva is unknown.

M. minor, n. sp.

Closely resembling *Nola minuscula*, but larger and differing in generic characters. Gray, the male almost whitish, the female more ashen; a dark shade on basal fourth of costa; t.-a. line fine, dark, obscure, undulate and notched; two short lines on costa in median space, reaching subcostal vein only; a slight black streaking at veins 3 and 4 at base. T.-p. line distinct, slender, black, strongly arcuate outward beyond cell; s.-t. line obscure, pale, waved. Hind wings pale, smoky tinged outwardly. Expanse 21 to 25 mm. Three males, one female. Santa Rita Mts., Arizona (E. A. Schwarz). Types in U. S. National Museum (Type No. 4113), and in the British Museum.

The larva is unknown.

M. dentata, n. sp.

Similar to the preceding, though still smaller. Fore wing elongate, ashen; a slight dark shade on costa at base; t.-a. line narrow, dark, running outward to a sharp angle in the cell, where it touches a round dark spot in a dusky cloud that rests on the costa in the centre of the median space. T.-p. line strongly arcuate outward beyond the cell, finely dentate, the tips of the dentations forming points that are stronger than the otherwise faint line. Terminal space indefinitely clouded, the subterminal line hardly resolved. Hind wing pale, cinereous tinted. Expanse 19 mm.

One male, Chiricahua Mts., Arizona, July 4th. (H. G. Hubbard.) U. S. National Museum; type No. 4114.

The larva is unknown.

The larvæ of our Nolidæ are known in 40%. Of the Eastern species, 55% are known.

*In my description (Journ. N. Y. Ent. Soc., VI., 43), I stated that vein 4 of hind wings was absent. It is really present, but so long stalked with 3 as to be almost on the margin of the wing, and I overlooked it. Male antennæ pectinate.

NOTES ON SOME NEW MEXICO BUTTERFLIES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Lemonias Duryi, Edwards.—I have before me a ♀ taken by Mr. S. Macgregor in 1898 between Mesilla Park and the Organ Mts., N. M.; that is, in the exact type locality of the species, originally collected by Mr. Dury in 1881. The specimen expands an inch and a half, and is thus larger than Dury's, but is otherwise the same. I do not know why Dr. Holland states (Butterfly Book, p. 230) that the ♀ *L. Duryi* figured by him is the only one known; Dury took several, and Edwards describes from both sexes.

Anosia strigosa, Bates.—A beautiful specimen of this insect was taken (1898) by Mr. S. Macgregor close to Little Mountain, Mesilla Valley, N. M.

Heterochroa (or *Adelpha*) *californica*, Butler.—This beautiful butterfly is common in the Organ Mts., N. M., a more eastern locality than any I find recorded for it.

Satyrus Meadi, Edw.—Fillmore Canon, Organ Mts., N. M., Aug. 29; collected by Prof. C. H. T. Townsend.

Neonympha Henshawi, Edw.—This is rather common at Dripping Spring, Organ Mts., N. M., 5600 ft., and I took it on Tuerto Mtn., near Santa Fé, Aug. 7, at 8875 ft. Thus it has a vertical range of at least 3275 ft.

Melitæa chara, Edw.—Common flying in a grassy spot near the western base of the Organ Mts., N. M., 1898. (Ckll. and S. Macgregor). This is an austral representative of the subalpine or subboreal *M. minuta*, the latter flying at much higher altitudes. *M. chara* has hitherto been reported only from Arizona.

Chlorippe montis, Edw.—Common on the western side of the Organ Mts., N. M., at about 5000 ft., in the neighbourhood of *Celtis* bushes. This is the Upper Sonoran representative of the Lower Sonoran *C. antonia*. The Organ Mt. examples are strongly fulvous above, not pale ashen-gray as Holland (Butterfly Book, p. 190) has it. Edwards (Papilio, Vol. III., p. 7) states that his types of *montis* were fulvous above. All that I have seen have the ocellus in the lower median interspace blind, while that in the upper has a white spot.

Phyciodes nycteis, Dbl. and Hew.—Taken by Prof. E. O. Wooton, on Ruidoso Creek, N. M.

Eresia texana, Edw.—Dripping Spring, Organ Mts., N. M., 5600 ft., April 20. (Ckll.)

Catopsilia sennæ, L.—Mesilla Valley, N. M. Mr. S. Macgregor took a ♀ var. *orbis*, Poey, near Little Mountain. The varieties named *orbis*, Poey; *pallida*, Ckll.; *hyperice*, Sepp., and *pomona*, Donovan, appear to be practically identical.

Euchloe Reakirti, Edw.—I took a ♀ of this at Dripping Spring, Organ Mts., N. M., April 24. The lower wings are delicately suffused with lemon-yellow, showing some transition towards *stella*, but in all other respects the insect is true *Reakirti*. The insect has hitherto, I believe, only been found in California.

Lycæna acmon, Dbl. and Hew.—This species has a vertical range of at least 6000 ft.! At Mesilla Park, N. M., I bred it from *Astragalus Wootoni*, Sheldon.

Thanaos clitus, Edw.—I saw, but failed to capture, an example of this beautiful species at the western base of the Organ Mts., N. M., at the end of August. My recollection of it accords exactly with the figure in Dr. Holland's "Butterfly Book."

The following 14 species were collected by Mr. W. J. Howard in Grant Co., N. M.:

Satyrus alope, race *nephele*, Kirby.—♀. Similar to fig. 4, Pl. XXVI., of Holland's "Butterfly Book," except that there are three of the minute ocelli on the under side of the secondaries. This really belongs to Edwards's race *olympus*, by its locality and comparatively pallid colour; but the ocelli on the primaries are much larger than in Edwards's fig. 6, Pl. III., of *Satyrus*.

Melitæa leanira, race *fulvia*, Edw.—In the specimen before me, the secondaries beneath are yellowish-white with black markings, instead of "yellow-buff," but they may have faded. There is much resemblance to the Californian, *M. Wrightii*, as figured by Holland, but there is not the fulvous at the base of the primaries, and the secondaries beneath are not so heavily marked in our insect.

Melitæa thekla, Edw.—One specimen. *Euwanessa antiopa*, L.; *Pyrameis cardui*, L.; *P. huntera*, Fab.; *Euptoieta claudia*, Cram.; *Synchlœ lacinia*, var. *crocale*, Edw.; *Anosia archippus*, Fab.; *Meganostoma casonia*, Stoll.; *Colias eurytheme*, Boisd.; *Terias mexicana*, Boisd.; *T. nicippe*, Cram.; and *Heterochroa californica*, Butler.

A CLASSIFICATION OF THE NORTH AMERICAN
MYRMELEONIDÆ.

BY NATHAN BANKS, WASHINGTON, D. C.

Some time ago in examining our species of ant lions I noticed that our two large genera, *Myrmeleon* and *Brachynemurus*, could readily be separated by the position of the origin of the radial sector; in one much nearer to the base of the wing than in the other. The characters previously used for *Brachynemurus*, as the forked costal veinlets, the length of the tibial spurs, etc., had not been satisfactory; and the discovery of this distinction led me to examine the other forms of the family with a view to their better classification.

It is evident that the double series of costals is not in itself of generic importance, for in *Maracanda* one species has a double series, and another species, closely allied, but one series; and, more than this, there are numerous gradations. The use of the tibial spurs, or, better, the length of the first tarsal joint, differs so much in species that appear otherwise closely allied that I cannot see how it can be of generic value. Yet definite differences in this matter, taken in conjunction with other important characters, may well serve to distinguish genera.

In applying the characters I have put chief rank on the origin of the radial sector. This point is best brought out by comparing the ending of the anal vein with the origin of the first fork of the radial sector. This divides the family, as represented in our fauna, into two groups, each of four genera. By such a division I was surprised to see that *Myrmeleon* was more closely allied to *Acanthaclisis* than to *Brachynemurus*, yet such a relation is sustained by many other characters.

Myrmeleon ingeniosus has long been recognized as differing considerably from the other species of *Myrmeleon*, and for it I have erected a new genus. Some might think that *Brachynemurus longipalpis* would also form a new genus, but it differs in no important character from other species of *Brachynemurus*, except the long palpi. There are other important structural variations in this genus; for example, the origin of the radial sector in the hind wings, and the amount of elevation of the vertex. Some specimens of *B. abdominalis* have an elevated vertex, but many Eastern examples have a very low vertex and more prominent eyes. But these variations, though very remarkable, do not appear to indicate specific differences.

TABLE OF GENERA.

1. Anal vein of fore wings ends much before the origin of the first fork of radial sector, often before the radial sector itself; six or more transversals basad of the radial sector; pronotum broad.....(*Myrmeleoni*) 2.
 Anal vein of fore wings ends as far out or often farther than the origin of the first fork of radial sector, usually less than six cross veins basad of radial sector; pronotum often more slender.....(*Dendroleoni*) 4.
2. Legs very short and stout, very hairy; tarsus I. much shorter than tibia I., large species.....*Acanthaclisis*.
 Legs much more slender, not very hairy, tarsus I. scarcely shorter or usually longer than tibia I., usually smaller species.....3.
3. Spurs on leg I. scarcely longer than first tarsal joint; in hind wings usually three or four cross veins basad of radial sector; tarsus I. about as long as tibia I.; hind wings quite narrow, without large spots.....*Myrmeleon*.
 Spurs on leg I. as long as first three tarsal joints; in hind wings usually but one cross vein basad of radial sector; tarsus I. shorter than tibia I.; hind wings quite narrow, without large spots.....*Psammoleon*.
 Spurs on leg I. as long as first two tarsal joints; in hind wings about two cross veins basad of radial sector; legs very slender; tarsus I. shorter than tibia I.; antennæ very slender, scarcely clavate; hind wings broad, with large spots.....*Glenurus*.
4. No tibial spurs; first tarsal joint of leg I. as long as next two; in hind wings the cubital fork runs parallel to anal for some distance.....*Maracanda*.
 Spurs present.....5.
5. In hind wings cubital fork is very short, the anal bending down and not running parallel to the fork; usually but one cell crossed basad of radial sector in fore wings; legs very slender; spurs slender; first tarsal joint nearly as long as next three; pronotum slender; wings with large spots.....*Dendroleon*.
 In hind wings the cubital fork runs parallel for some distance to the anal vein; spurs stouter; legs stouter; no large spots on wings.....6.

6. The cells basad of radial sector crossed and irregular ; a double series of costals almost to the base ; radial sector in hind wings arising before the origin of cubital fork *Calinemurus*.

Cells basad of radial sector rarely crossed, not irregular ; rarely a double series of costals before the middle of wing ; radial sector of hind wings often arising beyond origin of radial sector *Brachynemurus*.

Acanthaclisis, Rambur.

Our four species of this genus differ somewhat in structure, yet I hardly think sufficiently for a new genus. In *A. congener* the fork of the cubital does not run into the anal vein of hind wing as in *A. fallax*. The very stout legs are characteristic of this genus.

Myrmeleon, Linné.

In our forms there are two groups of species, those allied to *M. rusticus* and those near *M. immaculatus*. The species are very close to each other and difficult of separation.

Psammoleon, new genus.

One series of costals ; radial sector arising near the middle of wing, the anal sector ending before its first fork ; seven or eight transversals basad of radial sector in fore wing, but one in hind wings ; in hind wings the anal vein runs close to the fork of cubitus and then turns away ; hind wings narrow, as long as fore wings ; palpi short, last joint of labials swollen ; antennæ as long as head and thorax ; prothorax about as broad as long ; legs rather short and hairy ; first tarsal joint of leg I. short, the spurs about as long as the first four joints together.

Type *P. ingeniosus*, Walk.

Glenurus, Hagen.

Our one species, *G. gratus*, is very easily known by its beautiful markings ; the slender legs and antennæ readily separate this genus from the others of this section.

Dendroleon, Brauer.

Wings broad near tip, both pairs maculate ; anal vein of fore wings ending slightly beyond origin of first fork of radial sector ; about four cross veins basad of radial sector ; cubital fork of hind wings short, soon bent down to anal vein ; prothorax slender ; legs very slender, anterior tarsus much shorter than tibia. But one species, *D. obsoletum*, Say.

Maracanda, McLachlan.

No spurs; anterior tarsus about as long as tibia; legs not slender, rather short; anal vein of fore wings ends very much beyond origin of first fork of radial sector; two to four cross veins basad of radial sector; in hind wings the cubital fork runs parallel to the anal vein for some distance; costals single or double. Three species, *M. conspersa*, *signata* and *Henshawi*.

Brachynemurus, Hagen.

Anterior tarsus nearly as long or longer than tibia I.; legs quite stout; anal vein of fore wings ends beyond the fork of radial sector; only three or four cross veins basad of radial sector; in hind wings the cubital fork runs parallel to anal for some distance; first tarsal joint of varying length; costals with some forked before pterostigma, often very few. A large genus, but it does not appear to be naturally divisible. *B. longicaudus* is the type.

Calinemurus, new genus.

Two series of costals nearly to base of fore wings; anal vein of fore wings ends much beyond the first fork of the radial sector; the transversals basad of radial sector being mostly divided; in hind wings the fork of cubitus runs nearly parallel to anal vein for some distance; venation in both wings is rather irregular; palpi short, last joint of labials swollen; antennæ about as long as head and thorax; prothorax longer than broad; legs quite short, anterior tarsus about as long as tibia; spurs as long as first joint. Male appendages long and slender. Type *C. californicus*, Bks. *B. fraternus*, Bks., also goes in this genus, and possibly *B. inscriptus*, Hag. I add the description of an interesting new species of *Brachynemurus* from New Mexico.

Brachynemurus tuberculatus, n. sp.

♀. Face yellowish, dark brown between antennæ and above, with a narrow line in middle, and one each side extending down towards the clypeus; above on vertex mostly dark, with a pale spot each side behind; antennæ brown, the second joint paler; palpi pale. Pronotum brown, with an indistinct pale stripe each side; thorax brown, a pale stripe on each side in front of the base of the fore wings; a pale spot on middle of hind border of mesothorax; two pale marks near middle of metathorax; pleura brown. Abdomen brown. Legs pale; apical half of femur brown; a brown ring on middle and near tip of tibia; and a broad

brown mark on middle and a small one at tip of tarsus. Everywhere with sparse short white hairs. Fore wings hyaline; veins mostly dark, sparsely interrupted with white, the costals mostly dark, most other veinlets pale, and with a brown dot near the middle of each; a large mark at end of radial sector; along median vein there is a broad dark, almost black, line, occasionally interrupted; at end of cubital vein is an oblique dark stripe; the veinlets near margin of wings are richly marked with dark brown; pterostigma brown basally, yellowish apically, not touching the costa. Hind wings hyaline; veins dark, not marked, except pterostigma fuscous, and a dot at end of radial sector. Palpi rather short; antennæ of moderate length; on vertex there is a prominent conical tubercle each side; pronotum short, broader than long, narrowed in front; mesonotum with each anterior lobe elevated into a conical tubercle; abdomen ♀ shorter than wings; legs rather short, spurs scarcely as long as first tarsal joint. Wings of moderate length, pointed at tips; hind pair narrow, but little shorter than fore pair; two series of costals in fore wings nearly to origin of radial sector; four cross veins basad of radial sector; anal vein ending near middle of hind margin.

Length, ♀: abdomen, 17 mm.; fore wing, 20 mm.

Mesilla, N. Mexico (coll. Morse).

SYNONYMY.

Fam. COCHLIDIONIDÆ, Grote, ex Hübner 1806.

= *Cochlidia*, Hübn., 1806.

= *Cochlidie*, Hübn., 1816.

= *Limacodidæ*, Auct., post 1825.

= *Eucleidæ*, Dyar, 1894.

= *Apodidæ*, Grote, 1895.

= *Heterogeneidæ*, Meyrick, 1895.

Family type: *Cochlidion avellana* (testudo).

Gen. COCHLIDION, Hübner, 1806.

= *Apoda*, Haworth, 1809.

= *Limacodes*, Latreille, 1825.

The above synonymy is proposed as being more correct than the terms employed for the group in current literature. The first plural term is employed by Hübner and should be retained. I cannot find that *Cochlidion* is preoccupied. In any event the correct generic title of the type should be used to form the family name.

A. RADCLIFFE GROTE, Roemer Museum, Hildesheim.

OBITUARY.

Entomologists will learn with deep regret that Mr. HENRY G. HUBBARD died in January last. His papers, such as "The Life History of *Xenos*," "The Ambrosia Beetles of the United States," etc., will long be remembered, so remarkable are they for their scientific accuracy of observation and their extremely interesting character. The following notice is taken from the *Detroit Journal*:

"Born May 6, 1850, he developed from boyhood a remarkable interest in natural history, and even at an early age showed that fineness and delicacy of observation that distinguished the scientific work of his maturer years.

"After graduating at Harvard, in 1873, he remained in Cambridge as a graduate student in his favourite scientific branches, especially enjoying the friendship and encouragement of Louis Agassiz and Asa Gray. His real life-work began in Florida in 1879, where he soon achieved a wide reputation, both as a practical horticulturist and as a scientific investigator in the economics of orange culture. In fact, his discoveries and inventions can be said to have revolutionized this branch of horticulture. He was in government employ many years of his life as an expert in biology and applied entomology. As a botanist he carried on in his beautiful estate in Crescent City, Fla., an experimental station for the acclimation of West Indian and other tropical plants. Singularly gifted in that indefinable quality which we call magnetism, he could interest the most indifferent by accounts of his work and discoveries, or if the talk was in a lighter vein, his uniform gaiety and originality lent a charm to his most careless utterances.

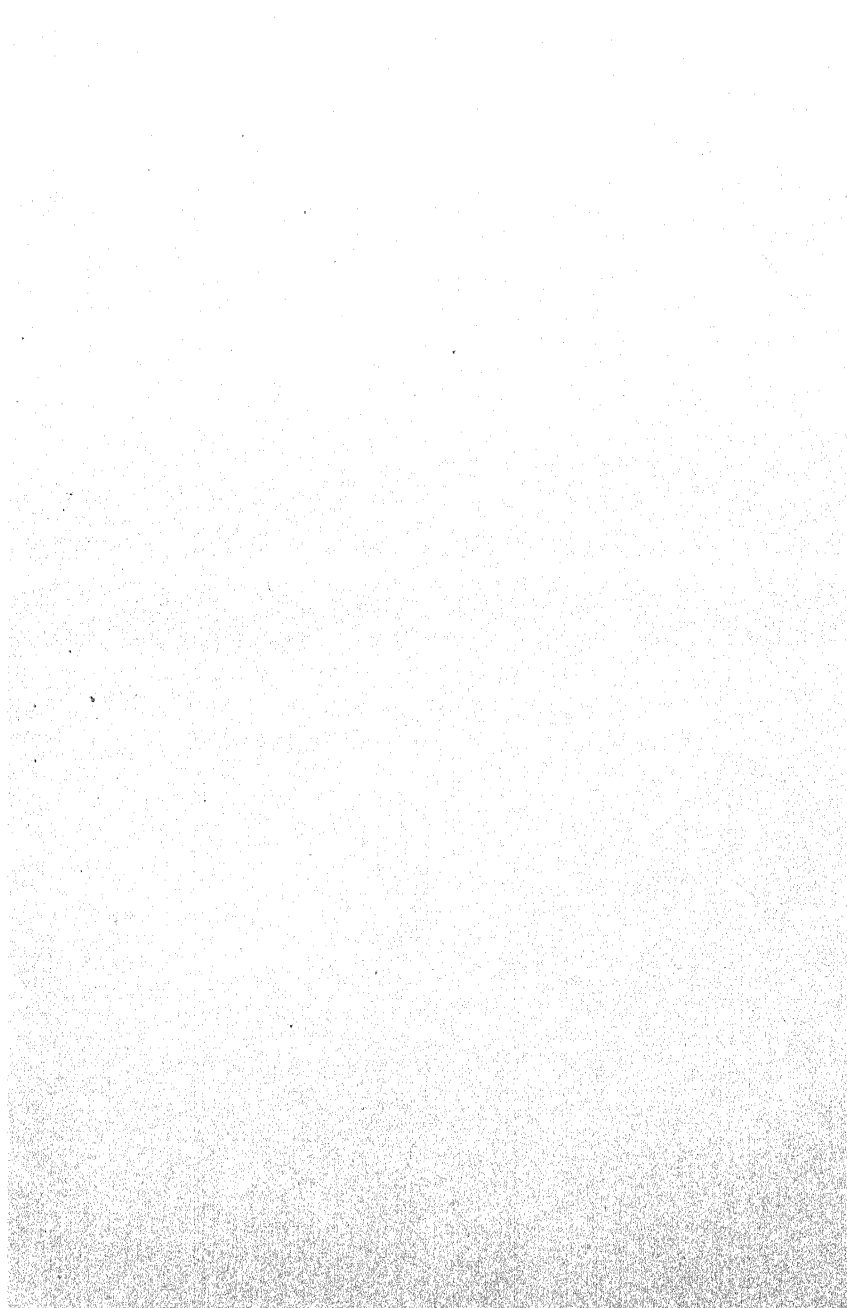
"As a contributor to the advancement of science, his forte lay in a field peculiarly his own—a field where keenness and delicacy of observation were all-important. His papers read before scientific clubs and associations were models of fine scientific treatment and also unusually interesting to the general public.

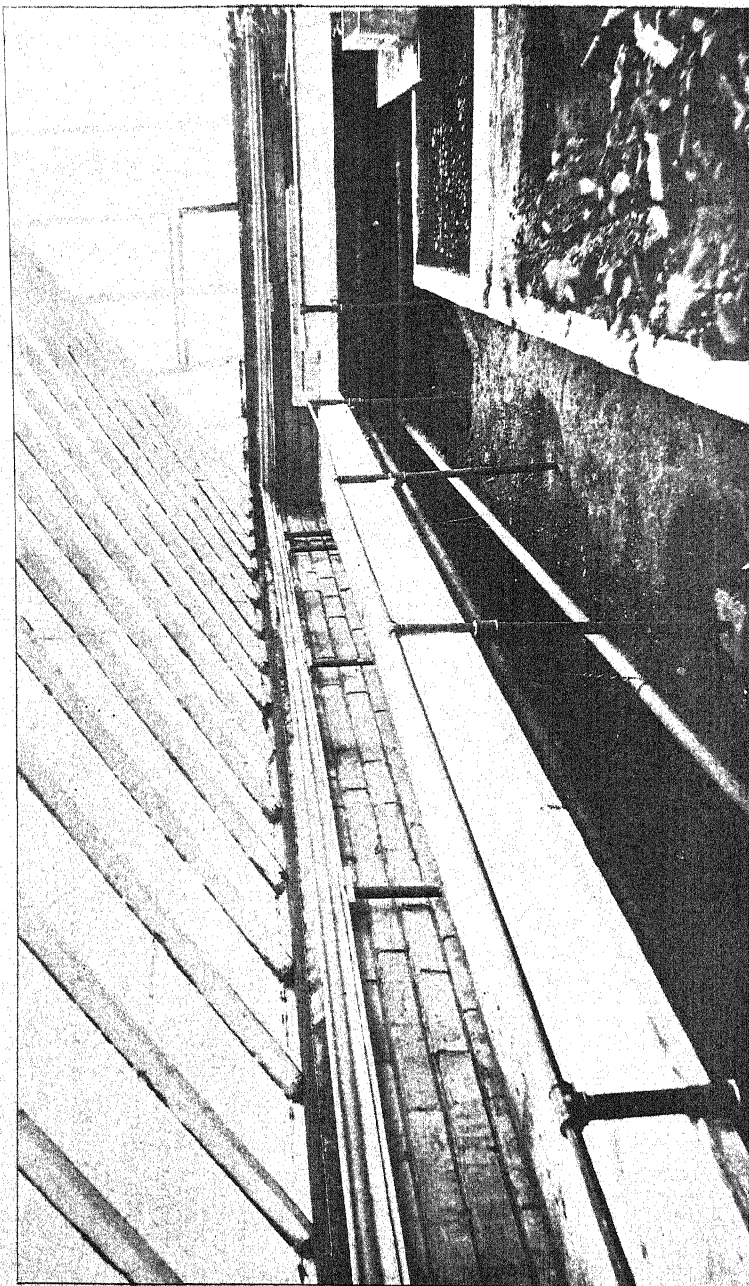
"Lovely in character and a true idealist as man of science or man of affairs, he lived a life equally noble and unselfish.

"'He scarce had need to doff his pride or slough the dross of earth,
E'en as he trod that day to God, so walked he from his birth,
In simpleness and gentleness and honour and clean mirth.'

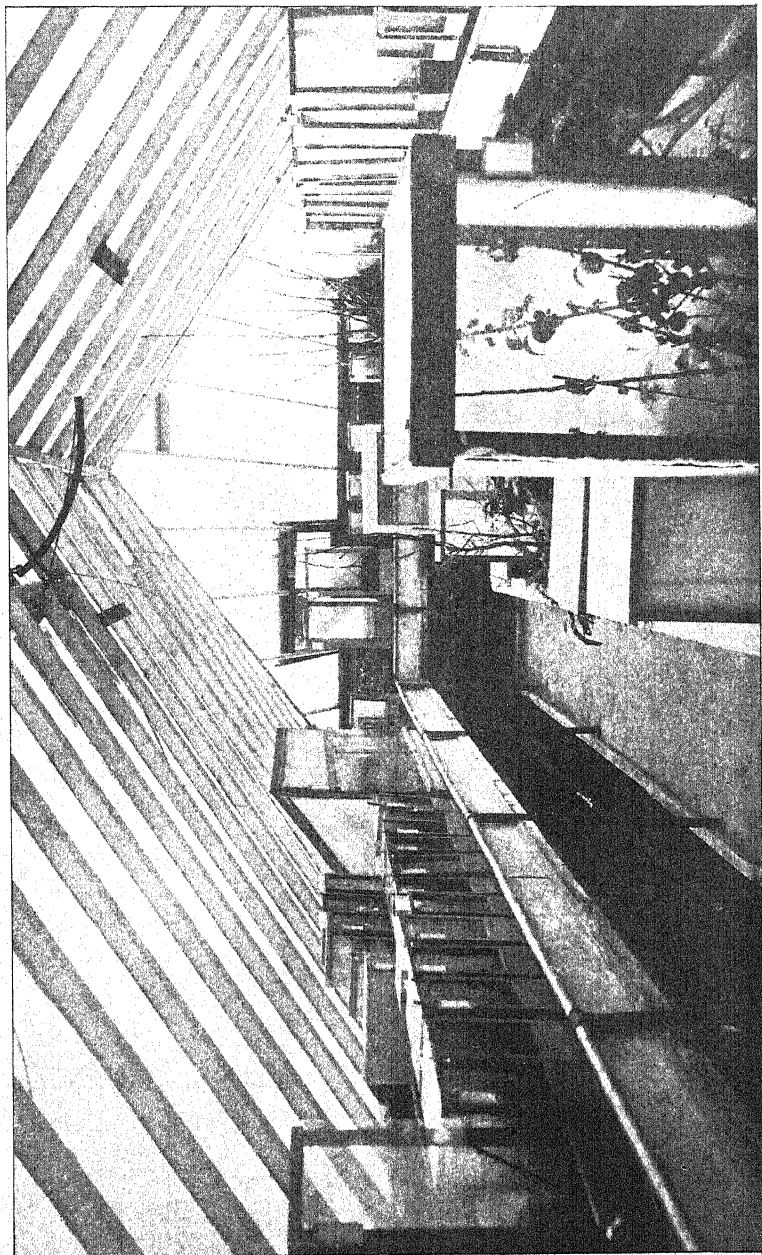
"T. H. P."

Mailed March 6th, 1899.





A SERVICEABLE INSECTARY.



A SERVICEABLE INSECTARY.

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No. 4.

A SERVICEABLE INSECTARY.

BY F. M. WEBSTER, WOOSTER, OHIO.

With the constantly increasing activity in applied entomology in America, the necessity for rooms or apartments especially adapted for the study of the development of insects is becoming each year more imperative. The insectary has, in fact, become almost as necessary to the working entomologist as has the laboratory to the chemist. While it is especially true in entomological investigations that one must "study nature where nature is," it is equally true that one cannot, in all cases, watch with the necessary care and constant application in the fields that he will be able to do in a fairly well equipped insectary. Not only can forms be transported thousands of miles while in an inactive state and their development watched at close range, as it were, but eggs and larvæ may be brought in during late autumn or winter and studied through their various stages, frequently long before they have appeared outside; and in cases of uncommon or unfamiliar forms this will give the investigator a vast amount of information that he can use to great advantage when the species appears in the fields under a natural condition, perhaps months later.

In the following it is not the intent of the writer to present an illustrated article on a "model" insectary, but to describe one that is in actual use, and the evolution of which has been the direct result of that mother of all invention—necessity. When any demand for certain facilities in order to study any particular species of insect has arisen, and this has constantly been the case, the ingenuity of myself and my assistant has been drawn upon to devise the best methods of accomplishing this end, and thus our insectary at the Ohio Agricultural Experiment Station has come into existence. The only object in presenting this paper is to place in the hands of working entomologists some ideas in regard to an insectary and its equipment, from which they can deviate as their position and requirements may demand. In other words, it may be used as something to work from in their efforts to get that which will best suit their requirements.

The insectary proper is constructed much after the plan of an ordinary greenhouse, the walls being made of hollow tile, and the movable sashes in the roof, for ventilating purposes, are enclosed in dormer-like, wooden frames, covered with swiss or a very thin cotton sheeting in order to prevent the introduction or escape of the most minute insects. A door at one end opens into a workroom, while a window in the roof at the other end is provided with a protected, movable sash like those previously mentioned.

Along three sides extends a bench, such as are in use among florists, except that, in this case, it is only about 30 inches in width, to facilitate the close examination of objects at the far side. A portion of the central space is occupied by a reservoir, and originally we had here also a wider bench.

Wooden benches were tried at first, but these soon decayed, while, as is well known, the larvæ of many species remain long in the earth and to disturb them is fatal, so we were obliged to cast about for something more stable to meet these requirements. We are now using, with apparently perfect success, a bench the construction of which is shown in Plate 3. The bottom is of ordinary stone flagging, two inches in thickness, and supported on a framework made of ordinary gas pipe. The upper side of this flagging is deeply grooved, about an inch from the edge, along each side. For the back of the bench ordinary roofing slate is used, the lower edges being fitted into the groove in the stone and embedded in cement, while the upper edges are held in place by a cap of galvanized iron running along the entire length. For the front a heavy galvanized sheet iron is used, the lower edge, as with the slate, fitting into the front groove in the flagging, while the upper is drawn over and turned under the smaller, horizontal gas pipe, the latter being held in place by a T joint, all of which is shown in the background of Plate 3. Before filling the benches, the inside of this galvanized iron front is coated with asphalt.

The wider, central bench was discarded altogether and the space enclosed by a low brick wall plastered with cement. This enclosed space is filled with earth and will accommodate shrubs and even small trees.

The finished benches, with the whole apartment in actual service, are shown in Plate 4. Formerly we placed soil in the breeding cages, and grew, or tried to grow, the food plants of whatever insects we

happened to be studying therein, but the plants seldom thrive well under such conditions, and the effect on the insects feeding thereon is unsatisfactory and in many cases fatal. Especially is this true where it becomes necessary to transplant from out of doors, as it frequently occurs that we wish to transfer a plant with the larvæ feeding upon it to a position that will enable the movements of the latter to be carefully studied. Under the new arrangement we can either grow the food plant in the benches or transplant it from the garden or field, place our insects upon it, and cover it with a breeding cage, thus eliminating to a considerable extent the objectional features of the old method. Or if we find an insect attacking a plant out of doors we can place one of the cages of the pattern that we are now using over the plant, and pushing the metal base into the soil deftly inclose the whole within our cage without in the least disturbing the insects that we wish to study under the most natural conditions possible.

The breeding cage now in use is shown in Figure 25 and also in Plate 4. It consists of a wooden frame of four upright pieces supporting a wooden top and with an upper base also of wood. Three sides are

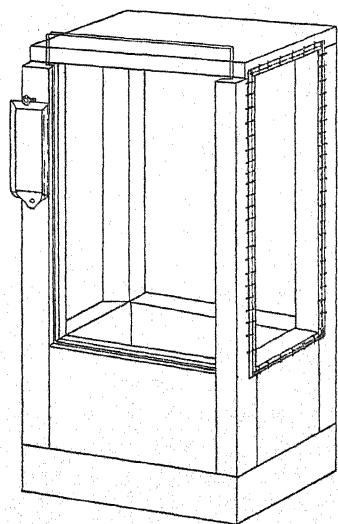


FIG. 25.

covered with swiss drawn tightly and fastened along the edges by means of galvanized iron strips about one-fourth of an inch in width, and these are in turn fastened to the wood by tinned staples, such as are used in laying carpets and matting. The remaining side is of glass, which is raised and lowered as required, and works in vertical grooves. By using galvanized iron strips and tinned staples the rusting out of the swiss or other cloth covering is avoided. The lower base is also of galvanized iron, and is shown in Figure 26, as is also the wooden bottom which fits inside of this, and can be used when needed, and when not may be readily removed and laid aside, as it is fastened in place by screws.

When used without the bottom it is only necessary to place the cage over the plant or plants and press it down until the metal portion is sunk

into the soil. The cage can be used out of doors as well as in the insectary, and without materially affecting the plant or disturbing the insects feeding upon it. When used with the wooden bottom the metallic base raises this above the damp soil, thus preventing the decay of the lower portion of the cage.

But "one supply reveals another want," and we soon found that there was a need of some method of keeping our notes and records conveniently attached to the proper cage to which they belonged, as well as

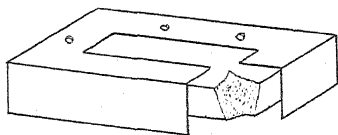


FIG. 26.

to protect them from being wetted whenever the benches were wet down with the hose. This led to the use of a holder of galvanized iron with a sliding glass front, fastened to the cages as shown at the left in Figure 25, and also in actual use on the cages in Plate 4. The holder is two by three inches, the sides turned over, and one end over these, while the other end is left a little longer and rounded, with a small hole to pass over a small nail or brad, while the other end is held by a small screw-eye, such as are used on picture frames to which to attach the ends of the cord or wire. The note sheet is folded the proper size and placed in the holder, and the rather close-fitting glass slide pushed in over it. The sheet is so folded that all of the notes will come on the same side, and each space or page is consecutively numbered, and, being all of a uniform size, these sheets when filled or the record finished, can be filed away for permanent preservation. This holder cannot easily become detached from the cage to which it is fastened, the notes are preserved from being injured by wet, the galvanized iron does not rust them, and the last record can always be seen through the glass cover without removing it from the cage. With slight modifications, this holder can also be used out of doors on shrubs and trees. For this purpose, what shows as the lower end in Fig. 25 is cut square off and a similar triangular piece is soldered to the back of the upper end to accommodate a fine wire which is used not only to attach the holder to the object, but the end running downward along the back is hooked over the lower end of the holder, thus effectually preventing the glass slide from being shaken out by the action of the wind. On cages outside, it is of course used in the same way as in the insectary.

SIX NEW OTTAWA PROCTOTRYPIDÆ.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

The following descriptions of species which appear to be additions to our fauna were prepared more than a year ago, but were withheld in the hope that more material might be obtained last season. That hope was, however, not fulfilled; largely, perhaps, be it confessed, through lack of sufficient perseverance on the part of the writer in collecting:

1. *LYGOCERUS PALLIPES*, n. sp.

♀.—Length 1.5–2 mm. Black, finely punctulate and sparsely pubescent. Mandibles and palpi yellowish; antennæ black, except the scape at base and beneath; scape stout, first joint of flagellum about half as long as scape, second as long as pedicel, remaining joints subequal. Legs, including coxæ, yellow. Wings subhyaline, stigma large, yellow. Abdomen stout, pointed at tip.

♂.—Antennæ with joints three to seven dentate; joints eight and nine broadened, two terminal joints slender.

Described from two females and one male captured near Hull, Que., on 2nd, 7th and 14th August, 1897.

2. *CERAPHRON CRASSICORNIS*, n. sp.

♀.—Length 2 mm. Honey-yellow, finely pubescent and closely finely punctate. Head large, transverse; face not deeply excavated; vertex with impressed line; ocelli black, in very small triangle; antennæ much incrassated, black, except base of scape, which is honey-yellow; scape stout, reaching above ocelli, tapering from base to about middle; pedicel short, first joint of flagellum twice as long and much stouter, second joint less than one-half as long as first, joints three to seven subequal, slightly larger than thick, last obconic not much larger than preceding. Thorax with distinct median furrow; the sutures at base of scutellum with large punctures; posterior margin of scutellum and the postscutellum black, the latter with a strong truncated spine; pleura transversely striated. Legs rather stout, entirely honey-yellow. Wings narrow, abbreviated, reaching only to middle of first abdominal segment. Abdomen stout, acuminate at tip, which is brownish dorsally; first segment with deep and long striæ, black on anterior margin.

This is a large and very distinct species, of which only one female has as yet been taken.

3. APHANOGMUS SALICICOLA, n. sp.

♀.—Length 1.5 mm. Black shining, but with head and thorax microscopically punctate. Thorax strongly compressed laterally, not more than one-half as wide as the large transverse head. Face polished; antennæ clavate, with scape and flagellum piceous, outer joints of club black; first joint of flagellum as long as pedicel; second shorter; three to five small, transverse; six and seven enlarged, subquadrate; terminal joint stout, longer than the two preceding, and rounded at apex. Legs piceous, with the tarsi pale. Mesothorax with hardly perceptible impressed line; pleura polished; scutellum elongate and constricted at base, tip slightly projecting; tegulæ black; wings faintly yellowish, costa brownish, stigmal vein yellow, almost twice as long as marginal, oblique, slightly curved at outer end. Abdomen short.

♂.—Antennæ about as long as body, pedicel short and stout, first joint of flagellum twice as long, second slightly shorter than first, joints three to eight about one-half shorter and gradually stouter, last joint elongate oval as long as first; basal joints subpedicellate with long hairs.

Described from one female and two males bred from galls of a Cecidomyiid, on willow.

4. TELEAS CANADENSIS, n. sp.

♂.—Length 1.7 mm. Black. Front smooth; orbits with fine striæ, cheeks and lower portion of face striated, clypeus transversely striated; a finely punctured band behind the ocelli, occiput smoother, margined; mandibles stout, rufous. Antennæ about as long as the body, moderately stout and finely pubescent; scape reaching to ocelli, pedicel scarcely longer than thick, first joint of flagellum more than one-half as long as scape, second slightly shorter, remaining joints subequal, about one-half as long as first. Mesonotum at sides and base longitudinally striated, smoother medially, with some large scattered punctures, suture at base of scutellum crenate, scutellum rugosely sculptured, spine short and horizontal; tegulæ piceous, wings subfuscous, legs piceous, femora and coxæ darker, trochanters, knees, and tibiæ rufous; pleura striated and rugosely sculptured, the mesopleura smoother centrally. Abdomen short, first and second segments striate, third finely aciculated basally, irregularly longitudinally punctured toward apex.

One male taken at Hull, Que., 26th August, 1894.

5. *BARYCONUS CINCTUS*, n. sp.

♀.—Length 1.8 mm. Black, with third abdominal segment and the legs rufous or yellowish. Head and thorax closely punctulate and almost opaque; face polished, with a delicate central carina; lower cheeks and face below antennæ with striæ converging to mouth; mandibles yellowish, palpi white. Antennæ black, except base of scape, which is rufo-piceous; pedicel small, first funicular joint twice as long as pedicel, second one-third shorter than first, third as long as pedicel, fourth small, subquadrate; club compact. Mesonotum without furrows; mesopleura with striæ converging toward pectus; metathorax rugosely sculptured. Wings hyaline, pubescent; marginal vein thickened, as long as stigmal. Legs, including coxæ, honey-yellow; the anterior coxæ varying to subpiceous. Abdomen subfusiform, longer than thorax and head, black at base and apex; third segment and part of second rufous; horn reduced to a polished convexity; first and second segments coarsely striate; remainder of abdomen closely finely punctulate.

Described from three females captured 19th and 29th August, 1894, by sweeping the low herbage of sandy pastures within city limits of Ottawa.

Superficially this species resembles *Opisthacanta mellipes*, Ashm., but is readily distinguished by the absence of mesonotal furrows and of the metascutellar spine.

6. *BARYCONUS BICOLOR*, n. sp.

♀.—Length 1.8 mm. Honey-yellow, with black head. Vertex finely punctulate, face polished, lateral ocelli almost touching eyes, mandibles and labrum pale. Antennæ with scape and pedicel pale yellowish, the latter small, hardly longer than thick; funicle and club black; first funicular joint twice as long as pedicel, second one-third shorter, third as long as pedicel, fourth small transverse; club consisting of six joints subequal in length. Mesonotum punctulate and pubescent, with faint furrows. Wings faintly yellowish, pubescent, with long ciliæ on costal margin; usually hardly reaching to apex of third segment of abdomen, but in one specimen more fully developed and extending almost to tip of the abdomen. Legs yellow, the knees sometimes darker. Abdomen longer than head and thorax; first and second segments striate, third segment almost quadrate, very highly polished, but faintly microscopically punctate, as are also the terminal segments, which, however, are more opaque.

The apex of the horn, which is not prominent, is always black, as are also the apical segments, including about half of third segment.

♂.—Closely resembles ♀ in coloration. Scape and pedicel pale, the latter short, first funicular joint fully twice as long; second, third and fourth shorter, remaining joints subequal with the first, except the terminal joint, which is slightly longer and slenderer.

Described from nine females and five males captured with the preceding species. They were taken by sweeping the grass around open sandy patches, intermixed with some small, closely-cropped raspberry bushes. Although apparently abundant on that occasion, I have not since been able to obtain the species.

This insect resembles a small *Caloteleia Marlattii*, Ashm., but the head is always entirely black, and the antennæ in both sexes are very distinct from those of that species; in the ♂ they are much more slender, with the joints more elongate.

THE NORTHWEST (CANADA) ENTOMOLOGICAL SOCIETY.

All entomologists in the Eastern Provinces of Canada will assuredly be gratified to learn that an Entomological Society has been formed, and is in active operation, in the "Northwest." The following are the officers:

| | | |
|---------------------------|---|-------------------------------------|
| <i>President,</i> | - | Percy B. Gregson, Esq. |
| <i>Vice-President,</i> | - | Rev. Edward John Chegwin, B. A. |
| <i>Librarian-Curator,</i> | - | Arthur Douglas Gregson, Esq., J. P. |
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Among the members may be mentioned: Mr. James J. Brewster, Banff, Alberta; Mr. W. A. Brewster, Edmonton, Alta.; Frank Oliver, Esq., M. P., Edmonton; T. N. Willing, Esq., Olds, Alta.; Right Rev. the Bishop of Calgary and Saskatchewan; John A. Simpson, Esq., M. L. A., Innisfail, Alta.; F. H. Wolley Dod, Esq., Calgary; A. G. Wolley Dod, Esq., Secretary of the Fish Creek Agricultural Society; Dr. H. George, Vice-President of the Innisfail Agricultural Society; Wm. Posthill, Esq., J. P., Vice-President of the Red Deer Agricultural Society; John J. Young, Esq., Editor of the *Calgary Herald*; James H. Tomlinson, Esq., and about thirty-five others who are engaged in agriculture. The labours of the Society are to include Botany, Geology and other branches of Science, as well as Entomology. Communications should be addressed to the President, Waghorn P. O., Alberta.

THE COLEOPTERA OF CANADA.

BY H. F. WICKHAM, IOWA CITY, IOWA.

XXXII. SUPPLEMENTARY REMARKS TO EARLIER PAPERS.

The following notes relate in large part to additions recently made to the Canadian fauna through the activity of collectors in the Dominion. Several species which their possessors were unable to identify by means of the tables have been submitted to me, and, proving new to the Canadian lists, are incorporated in these pages, that students may have access to the descriptions. The families are taken up in the order of their treatment in the CANADIAN ENTOMOLOGIST.

COCCINELLIDÆ.

In this family a great number of additions, comparatively speaking, have been made. Some of these are first recorded in Dr. Horn's memoir, entitled "Studies in Coccinellidæ," published in Trans. Am. Ento. Soc., Vol. XXII. Among them may be noted *Smilia misella* and several species of *Scymnus*.

Smilia is substituted for *Pentilia*, hitherto employed in our lists; and the Canadian species, *S. misella*, Lec., is the smallest Coccinellid known from the region, measuring only .04 inch in length. It is shining black, not pubescent, convex, prothorax a little narrower than the elytra, smooth, sides not explanate. Elytra distinctly punctured, suture finely margined. Behind the front angles of the prothorax is an indistinct obliquely impressed line. Dr. Leconte states that it is sometimes abundant on flowers of *Thalictrum*. It is more than probable that *S. marginata*, Lec., will also be found in Canada, in which case it may be recognized by the obliquely impressed thoracic line being distinct and the surface punctate. Both are about the same size.

In the genus *Brachyacantha* I have received two species not hitherto recorded from Canada. Mr. John D. Evans sent a specimen of *B. 4-punctata*, Melsh., taken in Eastern Ontario. Without reference to the generic characters this insect would probably be placed in *Hyperaspis*, but the anterior tibiæ have a spine on the outer margin. It is about the size of *B. ursina*, black, the tibiæ and tarsi pale. Each elytron bears two round reddish or orange spots, one basal, one sub-apical; these spots being separated from the suture by a space about equal to their own diameters. The male has besides a narrow anterior thoracic marginal line and humeral elytral spot yellow. From Mr. R. J.

Crew I have *B. dentipes*, Fabr., captured at Toronto. It is larger than the foregoing, reaching sometimes a length of .22 inch or more. Colour black, legs wholly or in part pale, head either black with yellow frontal spot (♀), or yellow (♂); the thorax has the sides broadly marked with the latter colour. Elytra with a broad orange or yellow band slightly before the middle, extending from the outer margin nearly to the suture, while near the tip is a rounded spot of the same colour. The markings are variable in extent, but the above description applies to the Canadian form (see Fig. 27).



FIG. 27.

In my paper on Coccinellidæ (number V. of this series) the genus *Scymnus* was not tabulated out, as the species were very poorly determined in collections, and Dr. Horn had just begun the study of them with a view to revision. A short time before the appearance of his paper (cited above) he kindly sent me a synopsis of the Canadian forms known at the moment, and this, with some changes and additions, I append below.

Most of the *Scymni* are broadly oval in outline and quite convex, giving them a nearly hemispherical appearance. A few are more elongate, and present a broken outline at the point of meeting between the prothorax and elytral humeri. All are pubescent. They are found by beating and sweeping during the warm months, while in spring and fall they may be captured on the under sides of stones or of pieces of wood in grassy spots.

Before attempting to trace the species through the use of a table, the student should familiarize himself with the structure called the metacoxal line. This is situated on the first ventral abdominal segment, appearing in most species as a fine raised line, describing a curve or arc behind the posterior coxal cavity, reaching from the inner border of the coxal to the neighbourhood of the outer anterior angle of the segment. It is very readily seen by means of any fairly good hand lens, but it is often necessary to move the hind leg on one side, so that the knee is directed straight backwards, otherwise the structure is obscured or covered up.

Perhaps the reference of *S. terminatus* to Canada may be open to doubt, but since the record is existent I have included it in the table.

- A. Metacoxal line not forming a complete arc, either joining the first ventral abdominal suture, or running parallel to it outwardly.

- b. Elytra with one or more yellowish spots.

Form oval. Head black or yellowish, thorax black, sides and front margin sometimes yellowish, tibiae and tarsi always so. Elytra black, with an oval yellow spot on each, one-third from apex, equally distant from side and suture. .06-.08 in. *flavifrons*, Melsh.

Form elliptical. Blackish, each elytron with two obliquely oval yellowish spots, sometimes coalescent. Legs reddish. .08-.09 in. *ornatus*, Lec.

- bb. Elytra not spotted, but with apex yellow, this colour extending one-fourth or one-fifth along the suture. General colour piceous, head, legs and thoracic margin yellow, abdomen usually so, two basal segments sometimes dark. .06-.075 in. *terminatus*, Say.

AA. Metacoxal line forming a complete arc, beginning at the inner edge of the hind coxal cavity, thence describing a curve and ending nearly at the anterior angle of the segment.

- c. Form broadly oval, outline of sides of thorax with humeri nearly continuous. Elytra never with discal spot, apex often yellow.

- d. Elytra pale at apex, sometimes narrowly so.

e. Apical pale space of elytra about one-fifth the length of the suture. Head yellowish, thorax piceous, with a very wide yellow margin. Elytra black, except as stated; abdomen piceous, paler at sides and tip; legs reddish-yellow. .08 in. *fraternus*, Lec.

- ee. Apical pale space narrow.

- f. Thorax partly black above.

Colour black, sides of thorax yellowish, less broadly than in the next species. Elytra with narrow apical pale space, abdomen often indefinitely paler at sides and tip, legs pale, femora more or less piceous. First ventral of male with median smooth area surrounded by short pubescence. .08-

.10 in. *puncticollis*, Lec.

Resembling the preceding species, head and thorax yellow, the latter with median basal spot of variable size. Legs reddish yellow, femora not piceous. First ventral of male without median smooth space. .08-.09 in. *collaris*, Melsh.

ff. Thorax entirely yellowish above, prosternum partly yellow. Head, tip and often also the sides of abdomen, with the legs, of the same colour, rest blackish.

.06-.09 in. *cervicalis*, Melsh.

dd. Elytra entirely black. Thorax without yellow margin, tibiae and tarsi usually pale, femora more or less piceous.

Size moderate, metacoxal line at apex of curve nearly reaching the suture between first and second ventrals. .08-.10 in. *lacustris*, Lec.

Size small, metacoxal line forming an arc, scarcely half as long as the first segment of abdomen.

.05-.06 in. *punctum*, Lec.

cc. Form oblong oval, more than one-half longer than wide. Thorax narrower than elytra. Sides nearly straight, except near front angles, where they are arcuate. Black, each elytron with a small oval reddish spot near centre, sometimes wanting. Legs dark. .06 in. *punctatus*, Melsh.

The name *haemorrhous* does not occur in the above table, since it is considered a synonym of *fraternus*. The spotted species, *ornatus*, *flavifrons* and *punctatus*, are quite rarely seen in collections.

Formerly the specimens of *Coccidula* from both sides of the continent were referred to *lepida*, Lec., as it was thought that the difference in colour was merely varietal in character. However, Dr. Horn has separated them as follows, both species being yellowish-red (or a bleached derivative) above, and piceous below, with the markings now described. The head is piceous, the legs yellowish.

Elytra with basal transverse piceous band, which joins at the humeri with a lateral stripe of the same colour reaching about two-thirds to apex. Suture with a blackish stripe connecting the basal band with a cordiform spot which is situated one-third from apex, .12 inch. This is

the Western form, found in Vancouver Island and British Columbia. It has the first two abdominal segments piceous, the rest yellowish, and is the species which I incorrectly called *lepida* in my paper (CAN. ENT., Vol. XXVI., p. 305).....*occidentalis*, Horn.

Elytra as in preceding, except that there is no sutural stripe connecting the basal band with the spot, which is transversely oval, not cordiform. The middle portions only of the first and second ventrals are piceous. Size of the other species. Found in the Eastern Provinces.....*lepida*, Lec.

ENDOMYCHIDÆ.

Quite recently I have received from the Rev. Geo. W. Taylor, a number of specimens of *Aphorista læta*, Lec., a most beautiful insect of this family. He took them at his home near Nanaimo, Vancouver Island. It is more than likely that the insect will be found also on the mainland of British Columbia, and the following description will render it easy of recognition, since the form is unmistakable and closely resembles that of the other species of this and allied genera. It is .28 inch. long, yellowish-testaceous, antennæ blackish, terminal joint more or less pale. The prothorax bears two small black spots, one on each side before the middle, and the elytra



FIG. 28.

have a very large common blue spot which covers most of the surface, leaving only the humeri, side margins and apex pale. It is shown in Fig. 28.

Another nice species has been sent for determination by Mr. John D. Evans, who took it in Eastern Ontario. It is *Mycetina testacea*, Ziegl., a small, yellowish-testaceous beetle, of more elongate form than either *perpulchra* or *Hornii*. The antennæ are piceous, but otherwise the colour is quite uniform—aside from a tendency of the sides of the prothorax to become a little paler than the disk. It is distinctly shining above, notwithstanding the covering of yellow pubescence. Length, .15 inch. Mr. Evans writes that he has only a single specimen, taken near Trenton in 1884.

The style of coloration (by lack of all pattern) is so different from that of *M. Hornii* and *M. perpulchra*, the previously-known northern forms, that the present species would not fall into the genus (nor any of the other genera) by the scheme which I used in the generic synopsis on

p. 338 of the CANADIAN ENTOMOLOGIST, Vol. XXVI. The fault may be corrected by changing the wording of the division "ccc" so that it may read "Thorax reddish or testaceous, elytra entirely testaceous or black, with two reddish spots on each."

CHRYSMELIDÆ.

Mr. R. J. Crew has collected, at Toronto, two species of *Zeugophora* not included in the Society's lists nor in my paper. Since these additions (*Z. Kirbyi* and *Z. scutellaris*) raise the total number of Canadian forms to five, it will be as well to reproduce in part the table recently published by Dr. Horn in Trans. Am. Ento. Soc., XIX., which runs thus:

A. Body, as seen from above, of one colour.

Pitchy black *abnormis*, Lec.

Entirely yellowish.....*Kirbyi*, Baly.

AA. Body above bicoloured.

b. Elytra entirely black. Head entirely yellow, punctures of elytra large and more distant than their diameters.....*scutellaris*, Suffr.

bb. Elytra parti-coloured.

Thorax entirely yellow, elytra with a cordiform discal space, the suture narrowly and the side margin yellow. outer half of antennæ piceous, the elytral punctures very close *puberula*, Cr.

Thorax with a discal piceous area divided at middle by a yellow line, elytra with a common oval or cordiform spot and the apex pale. Antennæ pale.. *varians*, Cr.

All the species are of nearly the same size, running from about .13 to .16 inch. in length. The name *Kirbyi* replaces *Reinecke* of the check-list. A figure of *Z. varians* is here given (Fig. 29), which will show the form of the genus.

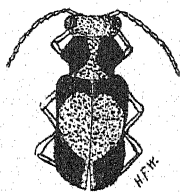


FIG. 29

THE ODOUR OF COCCIDÆ.

BY PROF. W. G. JOHNSON, COLLEGE PARK, MD.

I have been much interested in reading the notes upon the odour of scale insects by Professors Webster and Cockerell in the January and February issues of this journal. During my inspections in orchards and nurseries I have frequently detected the odour emitted by *Aspidiotus perniciosus*, mentioned by Webster, especially where the trees were badly infested, and have wondered what relationship it bore to the species. I have detected the most pronounced odours, however, in the genera *Chionaspis* and *Lecanium*. The odour produced by the *Euonymus* scale, *Chionaspis euonymi*, is very unpleasant to some persons. It is most marked upon badly infested, freshly cut twigs. If they are left in a tightly closed room for a few hours, the air will become very foul. When the scales are scraped or disturbed the odour is very offensive. The foulest of all odours emitted by scale insects, with which I have any knowledge, is that produced by *Lecanium nigrofasciatum*, recently described by Mr. Theo. Pergande (Bul. 18, Div. Ent. Dept. Agr.). It is popularly called the peach *Lecanium*, but I prefer to call it the terrapin scale on account of its close resemblance to that familiar animal. I am not sure, however, but that the term stinking scale would not be more appropriate, as it is certainly the most nauseating creature I have ever smelt. During the past week I was able to determine, specifically, by the scent with unerring accuracy specimens of this insect upon wild goose plum enclosed in a pasteboard box, wrapped with paper, sent through the mail for my examination, without opening the box. Two years ago I saw a seven-year-old peach orchard in Worcester County containing about 1,500 trees that was very badly attacked by this pest. The orchard was examined in September, and the whole atmosphere at that time was charged with this repulsive odour, which could be detected many rods away. Two other cases came under my observation last fall in the Blue Ridge Mountains, in Washington County. One orchard, eleven years old, containing about 900 peach trees, had become so completely overrun by this insect they were of no commercial value. The most repugnant smell emanated from this orchard that I ever encountered. The other orchard, peach also, contained 600 six-year-old trees, all of which were in the same general condition. When these insects are crushed or rubbed with one's finger the odour is very sickening, and can be detected on one's fingers even after repeated washings.

Whether or not this odour is for the purpose of attracting the male I

am not able to say, but I am inclined to think that it is not, especially in *Lecanium nigrofasciatum*. As this insect reaches considerable size, and remains upon the tree over winter, exposed, as a partially matured creature, it seems to me that the foul smell is for the protection of the species from the attacks of birds. On the other hand, I do not think this theory applies to *A. perniciosus* or *C. euonymi*, as neither of these species are sufficiently large to be attractive or available as food for birds. The odour here, therefore, may be for sexual purposes, or for attracting other insects. The former would hardly seem probable, because the sexes are found upon the same twigs, and we should not suppose the male would have any great difficulty in finding the female.

WEST AFRICAN MOTHS.

In the CANADIAN ENTOMOLOGIST, XXVI., pp. 69, 70, Mr. Geo. A. Ehrmann described as new three West African moths. Very recently this gentleman has been so obliging as to forward his types to me for examination. I should like to put on record a few observations on them for the benefit of students of the African fauna.

1. *Syntomis hilda*, Ehrm.

This should stand *Ceryx hilda* with *seminigra*, Holl., as synonym, and not as it does on page 46 of Hampson's monograph.

2. *Syntomis abdominalis*, Ehrm.

This belongs to the *Zygænidæ* (by the table of families in Cat. Lep. Phalænæ, I.), and should be erased from page 141 of Hampson's monograph. In Vol. I. of the Moths of India it falls into the genus *Tasema*, Walk., but yet differs obviously from that in wing shape. The fore wings are long, the outer margin very oblique, the hind wings small and narrow, quite characteristically Syntomid, which doubtless explains Mr. Ehrmann's erroneous reference.

3. *Pachypasa Nasmythii*, Ehrm.

This is a true Lasiocampid and falls in the genus *Taragama* by the table in the Moths of India. Female. Fore wings moderately broad, somewhat pointed at the apex, the outer margin oblique. Discal cell of both wings short; fore wings with veins 6 to 8 stalked, 9 and 10 on a separate long stalk; hind wings with vein 3 shortly stalked with 4 and 5; intercostal cell as long as discal cell, separate from it except at basal third, and with one distinct humeral vein in the moderately sized lobe. Palpi just reaching the frontal tuft; antennæ shortly pectinated; hind tibiæ with small terminal spurs.

HARRISON G. DYAR, Washington, D. C.

NEW, OR LITTLE KNOWN, ALEURODIDÆ.—II.

BY A. L. QUAINANCE, BIOLOGIST, GA. EXPT. STATION.

Aleurodes graminicola, n. sp.

Egg.—Size, .25 x .13 mm.; uniformly brownish in colour; unmarked; oblong, truncate at base; pedicel short, attached to one corner; eggs held nearly upright on leaf by short pedicel and truncated end.

Larva.—Length, .7 mm.; width, .3 mm.; oblong-elliptical in shape; colour, yellowish-white; eye spots reddish. There is a marginal fringe all around of white cottony waxen threads. No marginal rim, and but faint crenulation. In other respects, essentially as in pupa-case.

Pupa-case.—Length, 1 mm.; width, .46 mm.; in shape, oblong-elliptical. Under hand lens, yellowish-brown in colour, with a stripe of dark brown, more or less interrupted, along dorsi-meson. Pupa-case slightly raised from surface of leaf by a vertical fringe of white waxen rods. A rounded keel extends along dorsi-meson, more pronounced caudad. No marginal fringe of wax-rods, as in larva; marginal rim very narrow and indistinct. Outer margin of case rather minutely crenulated, the incisions between the wax tubes shallow and usually acute.

Abdominal segments quite distinct along middle line, but gradually fading towards the margins. Second thoracic segment distinct near dorsi-meson; third thoracic segment distinct, sinuate, extending nearly to margin on each side. A median suture extends cephalad from third thoracic segment to margin of case. On cephalic segment is usually a pair of reddish pigment spots, varying much in position and shape. Dorsum destitute of setæ, except a small seta on each side of vasi-form orifice. A pair of well-developed setæ extend caudad from caudal margin of case; also a pair of very minute setæ on caudo-lateral margin, a seta on each side.

On each side of keel, along dorsi-meson, are large depressions or pores, usually a pair to each abdominal segment, situated near cephalic margin of segment. The orifices of these are irregularly toothed or lobed, except on cephalic margin, which is formed by caudal margin of the preceding segment.

Vasiform orifice, cordate, about four-fifths as wide as long; the inner lateral margins are somewhat corrugated. Operculum not quite one-half length of orifice, about two-thirds as long as wide, and covered with minute spines, thicker and longer on caudal margin. Lingula somewhat spatulate, extending about three-fourths length of orifice; thickly set with

short spines, thicker and longer on distal end, where it terminates in two small lobes. From the ventral surface of distal end of lingula arises a pair of upward curving setæ, extending caudad almost to caudal margin of vasiform orifice. On ventral surface, rudimentary feet distinct.

Adult ♂.—About .8 mm. long to tip of genitalia; length of front wing .8 mm.; length of antennæ about .516 mm.; length of hind tibia .3 mm.; length of hind tarsus and claw .166 mm. Body uniformly greenish-yellow; wings immaculate; eyes reddish, distinctly divided, larger part ventrad. Antennæ of seven joints. Joint 1, short, obovate, one-half length of second; joint 2, somewhat club-shaped, and obliquely truncate distally; joint 3, long, cylindrical, slightly longer than 1 and 2 together; joints 4, 5 and 6 together, about equal in length to joint 3; joints 5 and 6, subequal in length, and one-third thicker than joint 4; joint 7, very long and tapering, being about equal in length to joints 3, 4, 5 and 6 together; joints 3, 4, 5 and 6 are rather coarsely ringed, joint 7 minutely spined.

On third pair legs, femur about two-thirds length of tibia; tarsi five-ninths length of tibia. Mentum much reduced, about as long as middle tarsi, excluding claw, slender at base, enlarged distally, and tipped with dusky. Operculum, in dorsal aspect, sub-rectangular in outline, somewhat concave on caudal margin, which is minutely setate. Lingula cylindrical, and truncate distally, but spreading at base, extending caudad beyond margin of operculum, somewhat more than length of operculum. On the truncated end is a group of setæ.

Penis slender, tapering, curved upwards, about two-thirds length of valves; valves rather short, stout, clasping at tip. On last segment of abdomen at base of each valve is a short fleshy protuberance. Wings delicately beaded all around; median vein of fore wing extending nearly to tip of wing; basal veinlet apparently arising free from median vein, extending obliquely to caudal margin.

Adult ♀.—Unknown.

Collected on an undetermined grass, July 24, 1898, at Lake City, Florida, by Prof. P. H. Rolfs.

Aleurodes Rolfsii, n. sp.

Pupa-case.—Length, .72 mm.; width, .45 mm.; varying somewhat; regularly elliptical in shape, raised on vertical fringe of white, waxen rods. Colour, clear whitish, with more or less of brownish frequently along dorsi-meson; the inclosed pupa is yellowish, with eyes reddish. Margin

all around minutely crenulated, the indentures between the marginal wax tubes usually rounded and shallow. There is a very narrow submarginal rim formed by the wax tubes. Marginal fringe wanting. Abdominal segments moderately distinct; a straight mesal suture extends cephalad to margin, from first abdominal segment. Four pairs of browish coloured setæ are usually present near the dorsi-meson; a pair on the prothorax; a pair on first abdominal segment; a pair at vasiform orifices, and a pair on caudal end of case, just within the submarginal rim. The cephalic two pairs are usually smaller than caudal pairs. The caudal pair is well developed, the setæ projecting dorso-caudad some distance beyond case. There is a pair of minute setæ on the margin of case near the caudo-lateral region. Dorsum with numerous pores and papillæ, from which arise long, curved, tapering, waxen rods. The papillæ are in a sub-marginal row all around, rather closely set, there being sometimes as many as fifty. These are somewhat variable in number and position, particularly in the thoracic region, where they may occur quite promiscuously on the dorsum. In the abdominal region they occur in more definite order, where they are in four longitudinal, somewhat curved lines. Those of the mesal two rows occur in pairs, a pair to each abdominal segment, except the last segment, where there may be two or more pairs.

Vasiform orifice pyriform, not quite as broad as long; cephalic margin straight; caudal end with acute indenture and finger-like process. Inner lateral and caudal margins corrugated. Operculum sub-elliptical, broader than long; not quite one-half as long as orifice, minutely spined on caudal margin. Lingula well developed, about three-fourths the length of orifice. Distal part of lingula with three pairs of lateral lobes; minutely spined, except at base, and bearing on distal end from below a pair of setæ, which project caudad just beyond orifice. Rudimentary feet moderately distinct.

Adult ♀.—Length to tip of genitalia about 1.20 mm.; length of front wing, 1 mm.; width of front wing, .41 mm.; length of hind femur, .21 mm.; length of hind tibia, .38 mm.; length of antennæ, about .3 mm. Body stout, light brownish-yellow in colour, with caudal margin of head, and the sutures of thorax more or less margined with brownish; legs and antennæ paler; eyes reddish. Front pair of wings marked with spots of smoky-black. There is a small spot at base, caudad of basal veinlet; two irregular spots near middle of length of wing, one on each side of wing; the caudal spot somewhat V-shaped, with the apex of the V turned

distad ; the spot on cephalic side of vein is irregularly rectangular, its inner end touching vein at its caudal flexure. At about distal fourth of wing are three irregular spots in a transverse stripe. The vein terminates in the median spot. When seen under a hand lens, these markings appear as two irregular zigzag lines extending transversely across the wing. When the wings are folded the stripes of one side appear continuous with those of the other side.

Antennæ seven-jointed. First joint short, subconical, about one-half as long as second ; second, about one-half as wide as long, truncate distally ; third, long, slender, five-sixths length of distal four together ; fourth, about three-fourths length of fifth, cylindrical ; sixth and seventh, subequal in length ; sixth, cylindrical ; seventh, swollen, tapering distally, bearing a terminal seta. Joints third and distally, rather closely ringed. Eyes completely divided transversely, the larger division ventrad. Mentum long, three jointed ; first joint short, about one-third length of second ; second long, being rather longer than third ; third usual, tipped with black. Rostrum short, conical, bearing three long setæ. In third pair of legs, femur slender, about two-thirds length of tibia ; tarsus and claw together as long as femur. Distal joint and claw of tarsus about as long as proximal joint. Vasiform orifice, as seen in dorsal aspect, subcircular ; operculum, slightly convex, with its caudal margin concave ; minutely setate on margin ; lingula projecting some distance caudad, club-shaped ; minutely setate. Main vein of fore wing nearer cephalic than caudal margin, making a bend caudad near the middle of its length. Basal veinlet arises distinct from main vein (possibly connected by cross vein at very base) extending obliquely backwards, reaching margin at about one-third length of wing. Wings all around on the margin delicately beaded. On cephalic margin of hind wings at base are seven to nine setæ.

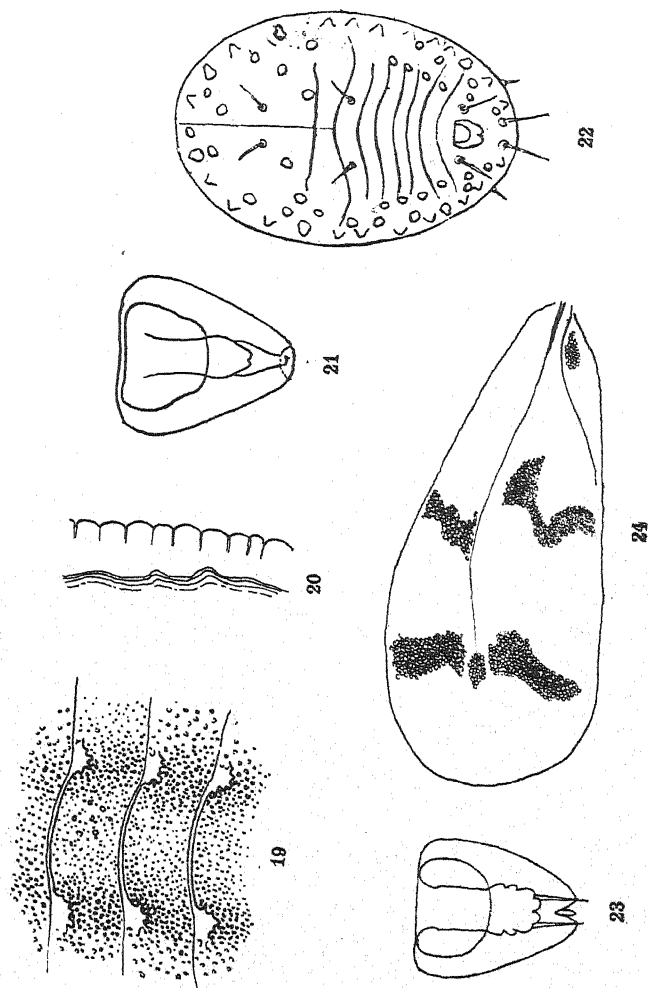
♂.—Length to tip of genitalia about 1 mm. ; proportionately smaller than female. Genitalia forcipate, an acute prominent tooth on each valve at base. Penis enlarged at base, tapering and curved upwards, about five-sixths length of valves. In other respects essentially as in female.

This aleurodid was sent in by a correspondent from South Florida, to Prof. P. H. Rolfs, on leaves of cultivated geranium, to which it was regarded as a severe pest.

EXPLANATION OF FIGURES.

Aleurodes graminicola.

Figure 19.—Illustrating pores on third, fourth and fifth abdominal segments of pupa-case.



Aleurodes graminicola (Figs. 19-21); *A. Rolfsii* (Figs. 22-24).

Figure 20.—Margin of pupa-case.

Figure 21.—Vasiform orifice, operculum and lingula of pupa-case.

Aleurodes Rolfsii.

Figure 22.—Pupa-case.

Figure 23.—Vasiform orifice, operculum and lingula of pupa-case.

Figure 24.—Wing of adult.

DESCRIPTION OF THE GOPHER MOTH.

BY J. B. SMITH, SC.D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

EPIZEUXIS GOPHERI, n. sp.

Ground colour a very pale mouse-gray, the wings with the appearance of being thinly scaled. On the thorax is a slightly warmer, more brown or reddish tinge, while the under side is darker and somewhat more smoky throughout. Primaries with all the lines diffuse and vague, except the s. t., which is distinct and very sharply dentated. The basal line is wanting. The t. a. line is pale, without defined margins, and crosses the wings with scarcely an out-curve. The t. p. line is yet more feebly marked except on the costa, and crosses the wing with a feeble out-curve, a little more marked than the outer margin of the wing itself. In the male this line seems to be better defined than in the female. The s. t. line is whitish, distinct, and irregularly toothed in both directions; that is, inwardly as well as outwardly — as a whole keeping at about the same distance from the outer margin throughout. The ordinary spots are very feebly marked; the orbicular a faint yellowish dot, and the reniform a somewhat larger blotch of the same colour; but in both cases indefinite. The secondaries are distinctly paler, more washed out and becoming almost whitish at the base. Toward the outer margin they are more nearly of the ground colour of the primaries, and here a pale, dentate, submarginal line becomes visible; much less defined, however, than the s. t. line of the primaries. On the under side the fore wings are uniformly smoky gray, without the glossy appearance of the upper side. The hind wings are much paler toward the base, and near the outer margin a faint reproduction of the line on the upper surface is noticeable.

Expands 1.12 to 1.20 inches = 28 to 30 mm.

Habitat.—In Florida; discovered by the late Mr. H. G. Hubbard, in the burrows of the land tortoise (*Gopherus polyphemus*).

One pair is before me; both specimens received from Mr. Hubbard. The male is somewhat crippled and in unsatisfactory condition, though all parts are present; but the female is in very fair shape and has all the characteristic features well marked. The species differs at once from all the other members of the genus by the strongly pectinate antennæ of the male. In no other of the species have we more than a strong serration, and by this one character the species can be easily distinguished. In other respects it bears a curiously close resemblance to that western form of the common *lubricalis* which I have named *occidentalis*. With the

females only at hand and without a history of the specimen it would be easy to mistake the new species for the California variety, except for the fact that the s. t. line is unusually sharp and strongly dentate in comparison with the vague suffused markings seen in *occidentalis*. Other structural details of the legs and of the palpi do not differ from the usual form found in the genus, and in the male we have that same peculiar formation of the anterior femur which I described in my monograph of the Deltoids and figured. Concerning the life-history of the species and the habits of the larvæ I refer to Hubbard's articles on the insect guests of the Florida land tortoise published in *Insect Life*, Vol. VI., No. 4, 1894, p. 305-306, and in *Proc. Ent. Soc. Wash.*, Vol. III., No. 5, 1896, p. 299.

MANITOBA BUTTERFLIES.

I have a further addition to make to my list of the Butterflies of Southern Manitoba, as the result of last summer's work. As in Africa of old, something new seems to be constantly turning up. The scarcity of grass in the usual prairie hay meadows drove me into a small "muskeg" of a few acres in extent, in a corner of the river valley, about a mile from my house. It is a veritable Serbonian bog in ordinary seasons—the grave of many a bison and wapiti, judging from the remains, in days gone by, and which has of recent years taken toll from time to time from our domestic herds. In it, at the end of July and the beginning of August, I took three or four specimens of *Thecla acadica*, and the same number of *Chrysophanus thoe*, and also a variety of *C. helloides*, smaller and more faintly marked than any I have taken before—the large form being generally abundant in certain places.

Butterflies were not plentiful last year, especially during the early summer, through the dry, cold weather that prevailed, but I made one notable addition to my collection. For some years I have been unable to do any "sugaring" during the harvest season, but this year I managed to paint a few trees, with the result that during the day time they were visited by several *Vanessa Californica*, of which I took three ♀s, my previous captures being ♂s, and saw several more. *Grapta prognæ* and *comma*—both varieties of the latter—also were attracted by the trees, and a very few *atalanta*, but nothing else.

At night, I took several species I have not before seen, and I particularly noted the absence of *Catocalas*. *Relicta* and *unijuga* used to be a positive nuisance, frightening all other species away. This year I did not see a single *unijuga*, only a few *relicta* and *briseis*, but several *concumbens*, which used to be very scarce.

E. F. HEATH, Cartwright, Man.

ENTOMOLOGICAL BOOKS.

The following is a copy of the circular recently issued by the Customs Department in order to clear up some uncertainty regarding the interpretation of the circular issued in July of last year. It is now made clear that all books on entomology may be imported free of duty:

Customs Department, Canada.

Ottawa, 13th February, 1899.

To Collector of Customs:

The following memorandum was issued on the 28th July, 1898, to customs ports concerned in the importation of entomological books, viz.:

"I beg to advise you that the Minister of Customs has determined that books on entomology, such, for example, as 'Insects Injurious to Vegetation,' by Dr. T. W. Harris; 'Guide to the Study of Insects,' by Dr. A. S. Packard; 'Insects Injurious to Fruits,' by Dr. Wm. Saunders; 'Manual for the Study of Insects,' by Prof. J. H. Comstock; 'Economic Entomology,' by Prof. J. B. Smith; and 'Entomology for Beginners,' by Dr. A. S. Packard, are entitled to free admission under the provisions of item 464 of the Tariff Act."

You are instructed that free importation of books of the above class is not confined to the special works herein described by name, but that entomological works may be classed as industrial books entitled to free entry under tariff item No. 464.

(Signed) JOHN McDUGALD,
Commissioner of Customs.

THE ODOUR OF COCCIDÆ.

Apropos of Professor Webster's note, on page 4 of the current volume of the CANADIAN ENTOMOLOGIST, concerning the odour of *Aspidiotus perniciosus*, and Mr. Cockerell's note on page 36 on the odour of *Toumeyella*, please allow me to remind these gentlemen and your other readers that I recorded a similar instance in the case of *Gossyparia ulmi* in Insect Life, Volume II., page 39 (August, 1889), on the authority of Mr. J. G. Jack. The wording is as follows: "At this time they secrete a great deal of honey-dew which attracts ants and other insects, and gives off, curiously enough, a pungent odour, which Mr. Jack states is noticeable where large numbers of the coccids are at work, but which we have not noticed at Washington, probably on account of the comparative scarcity of the lice."

L. O. HOWARD, Entomologist.

Mailed April 3rd, 1899.

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No. 5.

OBSERVATIONS UPON SPILOSOMA CONGRUA, WALKER.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

On the 29th of June, 1897, I found, in the Gomin Swamp, two *Spilosomas*, females, lying side by side. One of them was much spotted, and presented the exact appearance of the insect which is figured, with closed wings, in the original edition of Dru Drury's work, and named by him *Bombyx cunea*. The other was white, but on the median nerve, at the angle of the second fork, there was a small black dot, hardly perceptible. The thorax was clothed with light down; the abdomen was white and spotless. The eyes were black, as were also the under sides of the antennæ and feet. The front of the thorax under the head was luteous.

This second moth laid eggs on the 10th of July, and the eggs produced larvæ which, in due time, pupated. The moths appeared in the following spring.

I took the mother moth to the meeting of the Entomological Society of Ontario, at London, and readily identified it with specimens marked "*Spilosoma congrua*, Walker," in the Society's collections.

Of the imagoes raised from this insect some were allowed to escape, some I gave away, and a few were crippled; but I have twenty-eight of them before me at this moment, and they present a most interesting subject for study. I will group them:—

I. AS REGARDS THE WINGS:

- (a) Two males, all but immaculate, having the faintest indication of a dot at the second fork of the median nerve.
- (b) One male having a decided black spot at the point above mentioned.
- (c) Five males and seven females having the spot and indications of an irregular transverse row of dots near the hind margin.
- (d) Seven females with the spot and a well-defined row of black dots near the hind margin.
- (e) One male and two females with the spot, and a terminal row and sub-terminal row of dots,

- (f) Three males and one female with four rows of dots on the primaries, and a spot near the costa of the secondaries.

II. AS REGARDS THE ABDOMEN :

Eleven specimens are immaculate, and seventeen have longitudinal rows of spots.

- (a) and (b) have the abdomen immaculate.
(c) Two specimens have two distinct rows of black spots *on the under side*, and no more ; two have dorsal and side rows of spots, but none underneath. The rest have immaculate abdomens.
(d) One has five rows of spots, and six have the two rows on the under side only ; but of the latter one specimen has two black dots on the back.
(e) One (male) is immaculate as regards the abdomen ; one female has the five rows ; and the other has rows on the under side only.
(f) One (♀) has all five rows ; one (♂) has only the rows on the under side ; and one (♂) has an immaculate abdomen.

Of the males the usual expanse of the wings is 17 lines, but one reaches 20. Of the females the usual expanse is 20 lines.

I sent two of the moths to Washington, and Dr. Dyar kindly wrote me word that the insects belong to the species *Antigone* of Strecker. Mr. Lyman also submitted a pair of the same brood to Mr. Beutenmüller, who said that he had seen Strecker's types at Reading, Pa., a few days before, and that the species was certainly *Antigone*. Very well.

In Smith's list the *S. congrua* of Grote is given as a synonym of *S. antigone* of Strecker. What does Grote say on the subject ? "On my first visit to the British Museum I examined Walker's types, and made the following descriptions of his specimens"

Here follows a description that exactly fits my group (c). And he adds, "I was doubtful about its being North American. But very likely it is a form that Mr. Strecker calls *Antigone*, which must join that author's long list of synonyms." (CAN. ENT., Vol. XV., p. 9.)

But Walker gives his own account of *S. congrua* ; and, as the British Museum lists are not easily obtainable, and but few of our Canadian entomologists have copies of them, I ask room for the description in full.

"SPILOSOMA CONGRUA.

"Alba; palpi supra nigri; pedes antici nigro luteoque varii. Mas.—caput et thorax anticus subtestacea; alæ anticæ e guttis fuscis quadrisubfasciatæ.

"White. Tarsi with black bands. Fore coxæ and fore femora luteous, with black spots on the inner side; fore tibiæ striped with black on the inner side. *Male*.—Head and fore part of the thorax with a slight testaceous tinge. Fore wings with four oblique very imperfect and irregular bands, composed of pale brown dots. Length of the body 6-7 lines; of the wings 16-20 lines. a—c Georgia. From Mr. Milne's collection."

(*List of the specimens of Lepidopterous Insects in the collections of the British Museum. Part III. Lepidoptera Heterocera*, p. 669. Published 1855.)

With this description the insects in my group (f) agree. One has even the slightly testaceous thorax, which is not common; and another has the black spots on the inner side of the luteous femora. All have the four bands.

With my specimens before me I can entertain no doubt that Walker and Grote were describing forms of one and the same species. I state this after much consideration, for Smith says, in his "Preliminary Catalogue of the Arctiidae (CAN. ENT., Vol. XXII., 16), "Walker's description does not apply to *Antigone* at all, while it does apply to *cunea*, a specimen of which, according to Butler, was of the *types*."

What is meant by *cunea*?

There is a moth well known all over North America. It was described and named by Harris (Insects Injurious to Vegetation, pp. 357-9), and much valuable information respecting it has been given by Dr. Bethune (CAN. ENT., Vol. V., p. 141), Professor Saunders (Insects Injurious to Fruits, p. 171), and others. It is the Fall Web-worm Moth, the *Hyphantria textor* of Harris.

Of this *H. textor* we have in Canada but one brood in a season. Its eggs hatch "from July 10th to the middle of August" (John G. Jack, CAN. ENT., XVIII., 23). The larvæ are full-grown by the end of September. The moths have generally, in Canada, spotless wings and spotless abdomens, according to the descriptions given by Harris, Bethune, Saunders, and others, and their usual expanse of wings is 14 lines.

But southward, there is a second brood of *textor* which is noted for its variations. The most spotted of these, the extreme variety, is supposed to have been the *Bombyx cunea*, figured by Drury in 1770. And therefore it is said the name of the variety must take the place of the specific name given by Harris, and till very lately generally accepted.

Both Professor Riley and Professor Smith have well and clearly expressed the contention as it now stands. The former says :

"The moths vary greatly, both in size and coloration. They have, in consequence of such variation, received many names, such as *cunea*, Drury; *textor*, Harris; *punctata*, Fitch; *punctatissima*, Smith. But there is no doubt, as proven from frequent breeding of specimens, that all of these names apply to the very same insect, or at most to slight varieties, and that Drury's name, *cunea*, having priority, must be used for the species." (Riley quoted in Packard's *Forest Insects*, pp. 246-7.)

The latter says :

"In Mr. Grote's list of 1882, *textor* and *punctata* stand without number, but in Roman letters, and therefore not as synonyms. There is no doubt at all of the identity of all these forms. Prof. Riley has proved that to demonstration, if proof were required to the statements of earlier writers." (CAN. ENT., XXII, p. 165-6.) And in his *List of Lepidoptera of Boreal America* he gives :

HYPHANTRIA, Harr.

1096. *Cunea*, Drury.

punctatissima, S. & A.

punctata, Fitch.

congrua, Walker.

textor, Harris.

candida, Walker.

ab. pallida, Pack.

But is there really no room for doubt? Is the proof so entirely satisfactory? It might have been were there but one variable insect in the field to meet the requirements, but with two or more the matter is fairly open to question.

Let us consider the illustrations that accompany Prof. Riley's statement. I have them by me in that valuable work, Packard's *Forest Insects*, p. 245-6. First compare with the illustration of the Fall Webworm Moth on page 245, the illustrations accompanying Dr. Bethune's and Prof. Saunders's articles above referred to — the disproportion in

contour and size at once strikes the eye. Riley's cut represents an insect 20 lines in expanse of wings. I venture to say that no Fall Web-worm Moth ever attained such a size. But latitude was necessary to take in such moths as *congrua* and *cunea*. Then as regards the series of wings given on page 246. These we may conclude, from the whole tenor of the article, include representations of *cunea*, *punctata*, *punctatissima*, etc. They are on the scale of 18 lines for expanse of wings. *There is not one of them but can be exactly matched from insects I raised, or that were taken with the mother insect in the Gomin.*

Let us now consider the larvæ :

A comparison of the Rev. Dr. Hulst's account of the larvæ of *S. congrua* (Ent. Amer., II., 162), and of Professor Saunders's description of the larva of *S. cunea*, in its last stage, with the following life-history, written with care by myself, will, I think, show that the three descriptions relate to one and the same species.

Life-history of *Spilosoma congrua*, Walker :

Eggs.—Waxen, globular, laid dispersedly and unattached on the 10th of July, very small for the size of the insect—one-thirtieth of an inch in diameter. Hatched July 16th.

Newly-hatched larva.—One-tenth of an inch long, of a pale greenish tint, with a row of reddish-brown tubercles along the middle of each segment above. Every tubercle has two or three rather long, black hairs. Head dark brown. The larva feeds with avidity upon *Chenopodium album*, also upon *Taraxacum* and *Plantago*. It shows no disposition to spin. Moulded July 23rd.

Larva after first moult.—Length, three-tenths of an inch. Body reddish-brown, with black warts, from which proceed spreading tufts of long, black hairs with short spinous branches. Head bilobed, black. Feet black. Moulded July 29th.

Larva after second moult.—Length, half an inch. Body dark brown, with dark brown warts thickly set with tufts of black hair. A side line of red warts with a black tuft above and another below each wart. Larva exceedingly active—scuffles about in true Arctian fashion. Moulded August 8th.

Larva after third moult.—Length, one inch and one-tenth. Head shining black, bilobed. Body black, warty, densely clothed with jet black hairs. A side line of red warts as before, but hardly seen under the pile that overlaps it.

Mature larva.—One inch and three-quarters long. Body colour dark madder-brown, dotted with gray, and almost hidden by jet black bristly tufts which spring from jet black warts—these warts are arranged transversely in the middle of each segment. Along the sides is a row, closely two-fold, of chestnut-coloured patches. Head and fore legs glossy black.

Note.—*Every larva of the batch was true to this description.*

On August 19th, the larva formed a slight web, with hairs from its body intermingled with the meshes. The web was placed between leaves at the bottom of the breeding-cage.

Chrysalis.—First waxen in colour, then chestnut, and then very dark brown; plump, seven-tenths of an inch long, three tenths in diameter, and terminating in two clusters of spines—5 in each cluster. These spines taper regularly and are terminated with small disks.

To allow the moth to escape the breast portion of the chrysalis-case shells off in the form of an apple-pip.

The indications are that the much-spotted *Spilosomas* (one of which I mentioned at the beginning of my paper, and five of which were taken, in the neighbourhood of Quebec, in the season of 1897) hold the same relationship to *S. congrua* as the much-spotted *textors* do to their type. They answer exactly to the description of *S. cunea* given by Walker in the B. M. list above mentioned. We cannot, however, be absolutely sure on this point till we have bred moths from one of them.

OBITUARY.

By the demise of DOMINIQUE NAPOLEON ST. CYR, Esq., which occurred in Quebec on the 3rd March instant, from congestion of the lungs, at the age of 74 years, natural science has lost a worthy student and education a hearty promoter. He was born at Nicolet, P. Que., and educated at the college there. In 1867 he was admitted a notary public. Previous thereto he had been a model school and academy teacher. He was returned, in the Conservative interest, to the Legislative Assembly, Que., as member for the county of Champlain, at the general elections in 1875 and again in 1878. Going out of politics, he took up his residence in Quebec, and was appointed Curator to the Provincial Government's museum in the Parliament Buildings. Under his practical care and thorough knowledge of science, what appeared to be a heterogeneous conglomeration of specimens of all sorts, assumed shape as a very nicely classified museum. In it is preserved the valuable entomological collection of Abbé Provencher, which is, of itself, well worth a visit to students. As an entomologist and botanist Mr. St. Cyr will be much missed. His successor as Curator of the Provincial Government museum is Leonidas Larue, Esq., an M. D. of Laval University. J. EVELEIGH TREFFRY.

THREE NEW COCCIDÆ.

BY EDW. M. EHRLHORN, MOUNTAIN VIEW, CAL.

Nidularia (?) *californica*, n. sp.

♀ covered with wax resting on a thin white secretion. Colour orange-ferruginous, shiny, varying greatly in size and shape. The average specimens are about 3 mm. long, $1\frac{1}{2}$ wide, and 1 mm. high; generally pyriform, but it is difficult to give any special form, as the insect adapts itself to the position on the plant.

After boiling in K. H. O. derm is colourless, mouth-parts, glands and caudal portion remaining brown. There are indications of antennæ, which are very small and very bristly, segmentation not visible. There are four large disklike spiracles on the ventral surface, each disk contains numerous glands. There is a row of thick, blunt spines on each margin, and one on the dorsum. These marginal spines are shaped like a spear-head set in a socket. With these there are several rows of round spinnerets. Rostrum attached to a prominence, which, however, varies with the position the insect adopts.

End of abdomen strongly chitimized, with the margin strongly crenate and plicate, and deeply cleft in the middle as in *Lecanium*. Numerous round glands scattered near its margin, and several strong spines on margin at intervals. Anal ring with numerous (eight?) stout hairs. On the ventral surface opposite the anal ring there is a round projection with four stout spines. This is inserted in the cleft of the anal lobes.

Hab.—On the roots of Bunch grass, Mountain View, Cal.

Prof. Cockerell has examined specimens, and says that this strange coccid will probably form a new genus.

Dactylopius eriogoni, n. sp.

♀ enclosed in a densely woven white felt sac about $2\frac{1}{2}$ mm. long and 1 mm. broad; also secreting considerable loose cottony matter.

♀ colour light yellow, slightly covered with white powder, about 2 mm. long and 1 mm. broad. Last segment of body with two short white filaments. Legs and antennæ light brown. Young larvæ and eggs light yellow. When boiled in K. H. O. turns brown. Numerous very fine slender spines on dorsum. Antennæ 7-jointed, quite bristly. Sequence of the joints of the antennæ is quite variable. Joint 7 longest, then comes 3, then 1 and 2, but these are sometimes longer than 3. Joint 4 is next, but sometimes joint 6 is longer. Joint 5 is generally shortest. Formula approximately, 7312465.

Legs small and rather slender. Femur, tibia, and tarsus all bearing rather large stout bristles; femur twice as long as tarsus; claw slender. Tarsal digitules long, slender, slightly knobbed. Digitules of claw slightly longer than claw, slender, knobbed.

Anal lobes not conspicuous, bearing a long, rather stout seta, several stout conical spines, hairs and spinnerets. Anal ring medium, with the usual six hairs.

Hab.—On roots of *Eriogonum*, sp. Stevens Creek Canon, near Mountain View, Cal.

Kermes Austini, n. sp.

♀ scale spherical, about 4.5 mm. broad, 4 mm. long, 4 mm. high. (Amongst the material are a number of parasitized specimens, which are much smaller in size.) Dorsum slightly covered with a waxy secretion. Scale not gibbous and segmentation indistinct, indicated by brown dots when seen through a lens. Colour light brown, with several irregular white stripes running parallel with the segments. There is a distinct groove on the caudal portion of the scale, which is distinctly marked with brown. Scale more or less pitted. Pits generally marked dark brown or black. Ventral scale is more or less flat and light brown. Keel not very prominent. When boiled in K. H. O. derm is light brown, with several brown spots and numerous round glands—orifices, which are larger near the margin. A few short spines near the margin. Antennæ very short and stout, indistinctly 6-jointed. Joint 3 longest, 4 and 5 subequal.

Larva (taken from body of ♀).—Colour pink, twice as long as broad. After boiling in potash, colourless. Antennæ and legs yellow. Antennæ 6-jointed. Joint 3 longest, then comes 6 with numerous stout bristles and rounded at tip. Joints 2 and 5 subequal. Joints 1 and 4 about equal. Formula: 36(25)(41). Caudal tubercles large, with very long setæ and three stout spines—one at base of tubercle, one on its inner margin, and one near setæ. On the margin of body each segment has a stout spine. Legs stout. Tarsus not twice as long as tibia. Femur nearly as long as tarsus + tibia. Claw slender and curved.

Hab.—On twigs of *Quercus oblongifolius*, Guejito Mountains, eight miles east of Escondido, San Diego Co., Cal. (F. Austin, coll.)

This species is allied to *Kermes galliformis*, but smaller, with the darker parts of a decided fulvous colour. Prof. Cockerell has examined specimens, and agrees that it appears to be a valid species.

Lecanodiaspis rufescens, Ckll.

This species was sent to me from Los Angeles, Cal. Found on a new food plant, *Adenostoma fasciculatum*,

FOUR NEW DIASPINE COCCIDÆ.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Aspidiotus cueroensis, n. sp.—♀. Scale diam. slightly over 1 millim., circular, slightly convex above and beneath, with the margin somewhat elevated, like an oyster; very pale gray or grayish-white, quite a delicate shade, exuviae more or less to one side, covered, inconspicuous, but appearing as a dark spot on the inside of the scale. ♀. Shape ordinary; black when dry. No circumgenital glands. Anal orifice elongate oval, moderately large, distant from bases of lobes about $1\frac{1}{2}$ times its length. Only one pair of lobes, these and the area about their base remaining dark brown after boiling; lobes rather large, but short and broad, contiguous at the base, but thence diverging to their rounded apices, whence they slope downwards to the comparatively short outer side, the shape of the lobes being almost as in *A. ostræformis*. The second and third lobes, somewhat as in *A. coniferarum*, are represented by rounded prominences, which can hardly be said to project above the margin. Some distance below the place of the second lobe is a small round hyaline gland-spot, quite conspicuous; another, less conspicuous, is adjacent to the base of the rudimentary third lobe. Pyriform processes of the interlobular incisions short and inconspicuous; at the first incision the inner process is considerably larger than the outer. No plates, but the usual spines are present, a pair some distance beyond the place of the third lobe being quite large. Margin beyond the lobed area, and even within it, minutely crenulate. Dorsal glands extremely few, circular. In the area which in other species is occupied by the lateral groups of circumgenital glands, are longitudinal brown stripes, very conspicuous, apparently due to chitinous thickening. A less conspicuous transverse stripe occurs in the place ordinarily occupied by the median group of glands.

Hab.—On rough bark of trunks of *Celtis*, Cuero, Texas, June 1, 1898. (*C. H. T. Townsend.*) One specimen was badly infested by a fungus. Allied to *A. coniferarum*, Ckll.

Aspidiotus duplex, Ckll., var. *paoniae*, n. var.—♀. Has only two groups of circumgenital glands (the anterior and posterior lateral groups being united), each of 70 to 76 orifices. First three pairs of lobes conspicuously notched on each side; fourth lobe with one deep notch. At most only two or three minute squames beyond the fourth lobe. About 15 glands in the groups laterad of the mouth.

Hab.—On bark of peony from Japan, quarantined by Mr. Craw, at San Francisco. The peony bark, boiled in caustic soda, gives a very fine crimson or madder colour. Also on *Camellia japonica*, in California. (Dept. Agric., Div. Ent., 376^k.) The scales on *Camellia* were lighter than usual.

Diaspis celtidis, n. sp.—♀. Scale dark gray, exactly like the bark on which it rests, fairly convex, first skin visible, brown or ferruginous, placed near the margin. Greatest diameter of scale about 1 millim.

♀. No circumgenital glands, even in a female full of young. Two pairs of brown lobes; median lobes rather large, upright, separated by a fair interval, in which is a pointed squame extending very slightly beyond their tips; second lobes separated from the median by a similar interval; median lobes rounded at the end, deeply and squarely notched on the outer side; second lobes bluntly pointed, deeply notched on the outer side, the portion beyond the notch forming a pointed lobule, the whole lobe resembling somewhat a lower molar tooth of *Sorex*. Beneath each lobe is a pair of small pyriform brown glands; some distance beyond the second lobe is another pair of these glands, forming a brown patch, but without any lobe, and supporting a rather large spine. Dorsal glands few in number. Anal orifice small, a good distance from hind end.

♂. Scale of the usual *Diaspis* form, but short and broad, hardly more than twice as long as wide, dull gray, not in the least carinate; exuvia placed longitudinally at one end, large, not far from half the length of the scale, thick, dark brown, with small transverse ridges, and a light brown margin and central longitudinal ridge. Sometimes the whole exuvia is light brown.

Hab.—On *Celtis*, San Antonio, Texas, June 23, 1898. (*C. H. T. Townsend*.) Somewhat allied to *D. baccharidis*, but differs by the formation of the lobes and the absence of circumgenital glands. On the *Celtis*, at San Antonio, Prof. Townsend found also a variety of *Pulvinaria innumerabilis* (Rathv.).

Diaspis auranticolor, n. sp.—♀. Scale circular or suboval, diam. not much over 1 millim., only slightly convex, white, but covered with a gray film of the epidermis of the plant. Exuviae lateral, bright lemon-yellow, first skin exposed. Removed from the bark, the scales leave a white mark.

♀. Bright orange; light yellowish after loss of contents, the orange colour being contained in oil-like globules, not altered by caustic alkali.

Five groups of circumgenital glands, median of 9, anterior laterals 26, posterior laterals 16 to 19; two rows of dorsal transverse glands on pygidial area. Anal orifice level with hind part of anterior lateral groups of glands. Lobes not at all brown; median lobes large, pyramidal, blunt at end, their bases meeting but their tips far apart, the outer side crenate with two small notches, a small spine at each inner base. Second lobes represented by three rounded but rather elongate lobules, of which the middle one is considerably the largest; third lobes represented by two pointed processes, the second of which may be bifid at its end; fourth and fifth lobes represented by three or four pointed processes, like the teeth of a saw. Squames quite long, spinelike, with simple ends; one between the first and second lobes, two between the second and third, three between the third and rudimentary fourth, six between the rudimentary fourth and fifth, and about five large ones beyond the fifth.

♂. Scale of the usual form, white, without any keel; exuvia light yellow. Newly-hatched larvæ (alive) pale pink, without marks. (The larva of *D. amygdali* is pale yellowish.)

Hab.—On *Osmanthus illicifolia* (this is presumably a garden name for *O. aquifolium*, Siebold) from Japan, quarantined Feb. 3, 1899, by Mr. A. Craw, at San Francisco. Related to *D. amygdali*, but quite distinct.

A FEW CANADIAN LONGICORNS.

BY W. HAGUE HARRINGTON, F. R. S. C., OTTAWA.

Having prepared for the Ottawa Naturalist a list of the Cerambycidae occurring in this district, I find, among other Canadian material in my cabinets, the following species which appear worthy of record: For the Vancouver Island species I am chiefly indebted to my friend, Rev. G. W. Taylor, who resided near Victoria when the specimens were collected. Other material was collected by Mr. A. J. Hill, of New Westminster, B. C., and by Dr. Fletcher. Several of the species I captured when at New Westminster, etc., in 1888, and a few were received from Mr. T. C. Weston, of the Geological Survey, and from the late Capt. G. Geddes.

Ergates spiculatus, Lec. Two fine specimens from V. I.

Prionus californicus, Mots. Apparently common in V. I.

Tragosoma Harrisii, Lec. Cypress Hills, M.

Asemum atrum, Esch. Common, B. C. and V. I.

- Nothorhina aspera*, Lec. Several from V. I.
Criocephalus productus, Lec. B. C. (Mr. A. J. Hill, New Westminster.)
Criocephalus agrestis, Kirby. Stupart's Bay.
Criocephalus asperatus, Lec. Cypress Hills and B. C.
Phymatodes variabilis, Fab. Common, V. I.
Phymatodes nitidus, Lec. V. I. (Victoria.)
Phymatodes decussatus, Lec. Common, V. I., B. C.
Rosalia funebris, Mots. B. C. (New Westminster, Riverside, etc.)
Clytus planifrons, Lec. V. I. (One specimen.)
Neoclytus conjunctus, Lec. V. I. (Two specimens.)
Leptalia macilentia, Mann. B. C.
Toxotus vestitus, Hald. Very common in B. C. and V. I. The form with red legs and antennæ not rare.
Toxotus virgatus, Lec. Crane Lake, N.-W. T. (Prof. Macoun.)
Pachyta monticola, Rand. B. C. Very variable in colour.
Pachyta liturata, Kirby. Fort McLeod, Alta., and B. C.
Pachyta spurca, Lec. V. I. Very fine specimens.
Achmæops longicornis, Kirby. Fort McLeod. (Geddes.)
Leptura obliterata, Hald. V. I.
Leptura subargenta, Kirby. B. C. Very common.
Leptura lata, Lec. V. I. A fine species.
Leptura Canadensis, Fab. B. C.
 var. *erythroptera*, Kirby. B. C.
 var. *cribripennis*, Lec. B. C.
Leptura vagans, Oliv. Muskoka, O.
Leptura latifica, Lec. B. C. and V. I. Very common.
Leptura chrysocoma, Kirby. B. C. and V. I.
Leptura proxima, Say. B. C.
Leptura crassicornis, Lec. V. I.
Leptura scripta, Lec. B. C. and V. I. Very common.
Plectrura spinicauda, Mann. V. I. (Fletcher.)
Monohammus maculosus, Hald. Rat Portage, O. (Fletcher.)
Monohammus confusor, Kirby. Sydney, N. S., to Westminster, B. C.
Monohammus marmorator, Kirby. Cypress Hill. (Weston.)
Synaphæta Guexi, Lec. V. I. (Taylor.)
Acanthocinus spectabilis, Lec. B. C. (Hill.)
Oberea quadricollis, Lec. B. C.
Tetraopes femoratus, Lec. B. C. Common.

CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.—I.

BY GEO. B. KING, LAWRENCE, MASS.

The published records of the occurrence of coccids in Massachusetts are so scattered and the number found to exist is so large, that it seems quite desirable that they should be brought together and published in one entomological journal. So far as I can learn from careful search of the literature up to January, 1896, there had been only 13 species recorded. Since then the list has increased to 74. A list of the 13 species is: *Aspidiotus perniciosus*, *Mytilaspsis pomorum*, *Chionapsis furfurus*, *C. spartinae*, *Aulacaspis bromeliæ*, *Dactylopius adonidum*, *Phenacoccus aceris*, *Gossyparia ulmi*, *Orthezia insignis*, *Pulvinaria innumerabilis*, *Lecanium hesperidum*, *L. platycerii*, and *L. filicum*. A check-list reference-list of the literature of Massachusetts Coccidæ will be published in a supplementary article. Distribution, food plants, parasites, and predaceous enemies (known to me to occur in Massachusetts on coccids) will be given; also, the distribution of the Massachusetts coccids found in other States. This will show to some extent what little is generally known of these most destructive insects in this country. The only States that know, or have any material knowledge of, the number of these pests that occur within their borders are Colorado, California, Florida, New York, New Mexico, and Massachusetts; Washington, D. C., should also be added; New Mexico and Massachusetts leading, the former having 73 and the latter 74 species. I means introduced species; N., native species. The year placed after the author's name is the year in which the insect was described, and the other is the year when it was first known to occur in the State. The foreign distribution will only be given when found necessary.

COCCIDÆ.

Monophlebinae.

(1) *Icerya Purchasi*, Mask; 1878-1879. I.

This species was discovered by Dr. Hagen in a greenhouse at Cambridge, Mass., and this is the only instance that I know of its being found in this State. It is quite common in California.

Coccine.

- (2) *Eriococcus quercus*, Comst; 1881-1898. N. Syn. *Rhizococcus quercus*, Comst.

I found this coccid last year at Andover and Lawrence, Mass., on young white oak and *Vaccinium corymbosum*. It is found in Florida and Georgia on Laurel oak (*Quercus laurifolia*) and *Q. aquatica*, Gallberry and Grass. I have reared a *Chiloneurus* sp. from this coccid.

- (3) *Eriococcus azaleæ*, Comst.; 1881-1898. N.

Found at Methuen, Mass., on *Cratægus coccinea*. It has been taken at New York and Michigan on wild and cultivated Azalea; also at Washington, D. C., in the department greenhouses on Azalea.

- (4) *Gossyparia ulmi*, Geoff.; 1764-1887. I.

A very common pest. Found at Amherst, Boston, Brookline, Brighton, Concord, Springfield, Methuen, Andover, and Lawrence, Mass., on native white elm, Scotch elm, and Camperdown elm; also found at Washington, D. C.; New Jersey, Maryland, New York, Michigan, Western Nevada, and California, on *Ulmus americana*, *U. racemosa*, *U. campestris*, *U. montana*, and *U. fulva*. It is parasitized by *Coccophagus gossypariæ*, How., and has been reared by Mr. Cooley, at Amherst, Mass., 1898.

- (5) *Ripersia lasii*, Ckll.; 1896-1894. N.

Very often found at Lawrence, Methuen, Andover, North Andover, Dracot, and Haverhill, Mass., in nests of *Lasius americanus*, Gm., and *Lasius flavus*, L.; also found feeding on the roots of China asters at Lawrence; here also attended by *Lasius americanus*. All of the genus *Ripersia* found in Massachusetts are subterranean species and attended by ants. No males of the genus have been found by me. It is presumed that they are viviparous. Mr. R. J. Crew in 1897 found this coccid at Toronto, Canada, in nest of *Lasius americanus*, Gm.

- (6) *Ripersia Kingii*, Ckll.; 1896-1894. N.

It is abundant in ant-nests at Lawrence, Dracot, Methuen, and Springfield, Mass., found at the latter place by Dr. George Dimmock in 1898. Generally found in nests of *Lasius flavus*, L., and *Lasius claviger*, Rog.

- (7) *Ripersia flaveola*, Ckll.; 1896-1895. N.

A very common species found at Lawrence, Methuen, Dracot, and Haverhill, Mass., in nests of *Lasius claviger*, Rog.

- (8) *Ripersia Blanchardi*, King and Ckll.; 1897-1897. N.

Large and not often met with; found at Haverhill, Mass., in nest of *Lasius claviger*, Rog.

- (9) *Ripersia minima*, Tinsley and King; 1899-1898. N.

This is the smallest of the *Dactylopinæ* known; found at Lawrence, Mass., in nests of *Lasius americanus*, Gm.

- (10) *Dactylopius citri*, Risso.; 1813-1879. I. Syn. *Dactylopius phyllococcus*, Ashm.; *Lecanium phyllococcus*, Ashm.; *Dactylopius destructor*, Comst.; *farinosus*, Deg. (?); and *brevispinus*, Targ.

A first-class pest in all greenhouses at Lawrence, and no doubt in all the greenhouses in this State; very common on *Coleus* plants, Cacti, Geranium, Ivy-Hedera, and also found in ants' nests. It is recorded from Washington, D. C.; New Mexico, California, Florida, Colorado, and Minnesota, on *Habrothamnus*, *Solanum jasminoides*, Orange, Croton, Arabian and Liberian Coffee-plants.

- (11) *Dactylopius adonidum*, L.; 1769-1828. I. Syn. *longispinus*, Targ.; *Coffeæ*, Ledern; *Longifilis*, Comst.

This is another very common pest at Lawrence, Mass., in all greenhouses on palms and *Coleus*; it is found in ants' nests at Lawrence; at Washington, D. C., and New Mexico on a house fern. It is quite safe to say that the two last coccids cited can be found in nearly all of the greenhouses in Mass., although we have no such record, and perhaps in nearly every State if looked for.

- (12) *Dactylopius sorghiellus*, Forbes; 1885-1896. N. Syn. *Dactylopius* Kingii, Ckll. (variety).

Frequently found in nests of *Lasius claviger*, Rog.; *L. flavus*, and *L. americanus*, Gm., at Methuen, Lawrence, and Haverhill, Mass., on corn roots, leaf sheath and leaf sorghus, on roots of June and timothy grass, and attended by ants.

- (13) *Dactylopius sorghiellus*, var., Kingii, Ckll.; -1896. N.

Found with the same ants and in the same locality.

- (14) *Dactylopius claviger*, King and Tinsley; 1897-1896. N.

This species is found at Andover and Methuen, Mass., in nests of *Lasius claviger*, Rog.

- (15) *Dactylopius Cockerelli*, King and Tinsley; 1898-1896. N.

A very common species; found at Lawrence, Methuen, Andover, and Dracot, Mass., in nests of *Lasius flavus*, L.; *L. claviger*, Rog.; and *L. Americanus*, Gm. The above three species are subterranean and their food plants are as yet unknown.

- (16) *Dactylopius pseudonipæ*, Ckll.; 1897-1898. N.

This species seems to be quite common at Lawrence in greenhouses on various species of palms, and is also found in Michigan and California on palms in greenhouses.

- (17) *Phenacoccus aceris*, Sign.; 1875-1894. I. Syn. *Pseudococcus aceris*, Sign.

A very injurious species to Maples at Springfield, Jamaica Plains, Brookline, Norwood, and Holyoke, Mass. It is recorded from Rhode Island, Pennsylvania, New Jersey, Maryland, and Illinois, and is preyed upon by a coccinellid (*Hyperaspis signata*, Oliv.), observed by R. A. Cooley at Springfield, Mass., 1898.

- (18) *Phenacoccus americana*, King and Ckll.; 1897-1897. N.

This has only been found once in a nest with *Lasius americanus*, Gm., at Andover, Mass.

- (19) *Sphaerococcus sylvestris*, Ckll. and King; 1898-1898. N.

Found on a young white oak at Methuen, Mass. This is the first species of the genus to be found in North America. The type is in the national collection of Coccidæ at Washington. The genus is known from Australia to Japan.

Asterolecaniinae.

- (20) *Asterolecanium quercicola*, Bouche; 1851-1893. I. Syn. *Asterodiaspis quercicola*, Bouche.

A common species at Middlesex Fells, on white oak and swamp oak, at Medford on English oak, and Worcester on golden oak. Mr. A. H. Kirkland in 1898 reared several examples of a very interesting imported parasite, *Habrolepis Dalmannii*, from the Coccidæ at Middlesex Fells. All the parasites mentioned in this paper have been studied by Dr. Howard. The coccid has been found at Washington, D. C.; New York, and Connecticut, on imported European oaks and American white elm.

THE STENOPELMATINÆ OF THE PACIFIC COAST.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

A greater variety of generic types will be found among the Stenopelmatinæ of the Pacific Coast of the United States than in any other district of equivalent area in our country. I have therefore thought it well to make a list of them in connection with the description of a few new forms from that region. We owe our knowledge of the Orthoptera of that district mainly to the collections of Messrs. Henry Edwards, Behrens, Crotch, and latterly Morse.

STENOPELMATINI.

In my Guide to the . . . N. A. Orthoptera (1897) I carelessly overlooked the genus *Cyphoderris* Uhler, which belongs to the Stenopelmatini, but to a different group of genera from that to which *Stenopelmatus* belongs. The two groups may be distinguished by the following characters:

Fastigium of vertex confused with the front of the head, not produced between the antennæ; pronotum broader in front than behind, the front margin sinuate, with an intramarginal sulcus; fore coxæ unarmed; fore tibiæ with no foramina. *Stenopelmati*.

Fastigium of vertex separate from the front, produced more or less between the antennæ; pronotum not broader in front than behind, the front margin straight or convex, with no intramarginal sulcus; fore coxæ armed with a spine; fore tibiæ furnished with foramina on both faces or at least on the inner face. *Anostostomata*.

Stenopelmati.

Represented in the United States only by the genus *Stenopelmatus*, nearly all the species occurring in our country being found on, and most of them confined to, the Pacific Coast.

Stenopelmatus Burm.

Four species of this genus were credited to the United States, and all to the Pacific Coast, in Brunner's monograph of the Stenopelmatinæ (1888), and he did not recognize the species described by Haldeman in 1852 as *fuscus*, by Thomas in 1872 as *fasciatus*, or by Scudder in 1876 as *oculatus*, all from the region to the east of the Sierra Nevadas. The first of these it is impossible to determine, but types of the other two are before me. The species found in the United States and Canada may be separated by the following table:

*a*¹. Hind tibiæ armed with five spines* on inner margin above.

*b*¹. Head relatively small; hind tibiæ relatively long, being about or nearly twice as long as the pronotum on the mediodorsal line; the upper inner spurs of same much longer than the metatarsus..... *longispina*.

*b*². Head distinctly broader than pronotum; hind tibiæ relatively short, being hardly or not more than half as long again as the pronotum on the mediodorsal line.

*c*¹. The apical spine on the inner margin of the hind tibiæ markedly smaller than the preceding.

*d*¹. Hind tibiæ subrotundate above, the fourth spine of inner margin (counting from base) more widely separated from the third than the others from their neighbours, those of the outer margin two, rarely three, in number, the upper inner spur as long as the metatarsus..... *irregularis*.

*d*². Hind tibiæ sulcate or subsulcate above, the spines of the inner margin equidistant, those of the outer margin four in number, the upper inner spur much shorter than the metatarsus. *californicus*.

*c*². The apical spine on the inner margin of the hind tibiæ but little or not smaller than the preceding.

*a*¹. Outer margin with 5-6 spines..... *fasciatus*.

*a*². Outer margin with 2-4 spines..... *oculatus*.

*a*². Hind tibiæ with less than five spines on inner margin above; head not broader than pronotum.

*b*¹. Hind tibiæ with four equal spines on inner margin above, three on outer margin; head and pronotum nearly uniform castaneous, unpictured..... *histrion*.

*b*₂. Hind tibiæ with three spines on inner margin above, two on outer margin; head and pronotum castaneous, heavily pictured (on the head longitudinally) with dark fuscous..... *pictus*.

1. *Stenopelmatus longispina* Brunn. — A well marked species, readily recognized by its long hind tibiæ; the inner calcaria of the same are also exceptionally long, but in this it agrees with the next species. It was originally described from Vancouver Island. I have seen specimens from Fort Boise, Or., Suckley; Drain, Sept. 11, and Roseburg, Douglas

*Occasionally, by anomaly, there are but four spines on one or both legs. See below, under *S. oculatus*.

Co., Or., Sept. 10, A. P. Morse; California, Uhler, Dyar, Edwards; Coast of California, Trowbridge; and San Diego, Cal., Palmer.

2. *Stenopelmatus irregularis* Brunn.—This was described from Mazatlan, Mex., Arizona and California. I have specimens from near Lake Tahoe, Nevada, Sept., Henshaw; California, Edwards, Behrens, Dyar; San Francisco, Cal., Edwards, Bischoff; Sonoma and Marin Counties, Cal., Osten Sacken; San Bernardino, Cal., Feb., Palmer, and Ft. Tejon, Cal., Uhler.

3. *Stenopelmatus californicus* Brunn.—Originally described from Vancouver only, and notwithstanding its name, now first recorded from California. I have before me specimens from Drain, Sept. 11, and Roseburg, Douglas Co., Or., Sept. 10, A. P. Morse; Ft. Crook, Cal.; Mill Valley, Cal., Aug. 22, Morse; Nevada Valley to Cloud's Rest, Yosemite Valley, Cal., Aug. 12, Morse; 8-mile station, road to Yosemite Valley, Cal., Aug. 9, Morse; Tehachapi, Kern Co., Cal., Aug. 2, Morse; South Santa Monica, Los Angeles Co., Cal., Rivers (Morse); and San Diego, Cal., July.

Stenopelmatus fasciatus Thom.—I have seen only the single existing type, a female, in the U. S. National Museum, which comes from southern Idaho. It does not agree with Thomas's description in the spines of the hind tibiae, as it has five on the inner carina and five or six (differing on the two legs) on the outer carina; while he gives five on the inner and four (♂) or three (♀) on the outer carina. It is therefore doubtful whether all his specimens belonged to one species; if they did not, the others probably belonged to the next species, as it is the only other one known from east of the Sierra Nevadas, except in the south. Thomas credits the present species to Wyoming and Utah as well as Idaho.

I introduce the species here to complete the reckoning of the forms found in the United States and Canada, but prefix no number, as it is not known from the Pacific Coast.

4. *Stenopelmatus oculus* Scudd. (*S. hydrocephalus* Brunn.)—The specimens I have seen come from Harrison, Sioux Co., Neb., Bruner; Wyoming, U. S. Nat. Mus.; Utah, Suckley, Packard; Spring Lake Villa, Utah Co., Utah, Aug. 1-4, Palmer; St. George, Washington Co., Utah, Apr. 1-12, Palmer; Mt. Trumbull, Utah, June 7-10, Palmer; Mokiak Pass, Utah, Apr. 20-30, Palmer; Nevada, Akhurst, Edwards; Virginia City, Nev., Seckels; Carson Valley, Nev., Simpson; Ruby

Valley, Nev., Ridgway ; western Washington, U. S. Nat. Mus.; California, Edwards ; El Dorado Co., Cal., 4,000 feet, Gissler ; Sonoma and Marin Counties, Cal., Osten Sacken ; San Francisco, Cal., Edwards ; between San Luis Obispo and San Simeon Bay, Cal., Palmer ; Ft. Tejon, Cal., Uhler ; San Bernardino, Cal., Palmer ; Ehrenberg, Colorado River, Ariz., Palmer ; Fort Buchanan, Southern Arizona, Palmer ; Cantonment Burgoyne, mountains of New Mexico ; Las Cruces, N. Mexico, Cockerell ; Eagle Creek, White Mts., Lincoln Co., N. Mex., 7,000 feet, Wootton (Morse). This is our most widespread species.

It is possibly not distinct from the preceding, in which case the name *fasciatus* has precedence. It is somewhat more variable than the other species in the number of spines on the hind tibiæ, and there are even occasionally only four on the inner margin. The single specimen from Ft. Tejon, quoted above, has the inner upper calcaria of the hind tibiæ distinctly longer than the metatarsus ; it is a large male, measuring 39 mm. in length.

5. *Stenopelmatus histrio* Sauss.—This Mexican species extends into our territory. Specimens before me come from California, Edwards ; San Francisco, Cal., Edwards, Bischoff ; Sonoma and Marin Counties, Cal., Osten Sacken ; Pacific RR. explorations along Lat. 38°, Beckwith ; and Mexico, Sumichrast.

6. *Stenopelmatus pictus*, sp. nov.—Castaneous, heavily infuscated over the whole upper surface of the body. Head not broader than the pronotum, longitudinally broadly striped with dark fuscous over the vertex, hardly encroaching on the smooth genæ, nor quite reaching the back of the head ; front feebly and sparsely punctate ; eyes but little prominent, briefly subpyriform. Pronotum subquadrate, the front portion but little broader than the rest, the hinder angles broadly rounded, the disk, excepting before the submarginal sulcus, almost entirely dark fuscous, sometimes threaded with rufo-castaneous. Hind femora short and broad ; hind tibiæ broad and subequal on a side view, the outer face subrotundate, the upper plane, furnished above on the inner carina with three not very large, equidistant and subequal but distally enlarging spines, on the outer carina with two similar ones ; inner calcaria not very stout, even slender in the male, increasing a little in length from below upwards, the upper as long as (♂) or nearly as long as (♀) the metatarsus. Dorsal plates of abdomen dark fuscous, edged posteriorly with rufo-castaneous.

Length of body, ♂ 16.5 mm., ♀ 25 mm.; pronotum, ♂ 5 mm., ♀ 5.75 mm.; hind femora, ♂ 8 mm., ♀ 9 mm.; hind tibiæ, ♂ 8 mm., ♀ 9 mm.

1 ♂, 3 ♀.—California; San Francisco, Cal., Edwards.

This species differs from the Mexican *S. vicinus*, to which it appears to be most nearly allied, in its dorsal colouring, smooth genæ, stout and non-sulcate hind femora, the fewer spines on the outer carina of the hind tibiæ, and its longer, inequal calcaria.

Anostostomata.

To this group the United States can furnish but a single genus.

Cyphoderris Uhl.

As stated above, this genus was accidentally omitted from my Guide to the . . . N. A. Orthoptera, but its position therein is here indicated.* It falls in the vicinity of *Pherterus* Brunn., found in the Antilles and Brazil. It is the only one of our *Stenopelmatinæ* which is not apterous.

7. *Cyphoderris monstrosa* Uhl.—Oregon. I have seen only Uhler's types. Thomas records it from Wind River, Wyoming.

RHAPHIDOPHORINI.

Represented in the United States and on the Pacific Coast by two groups, *Tropidischia* and *Ceuthophili*.

Tropidischia.

The sole representative of this group occurs only on the Pacific Coast.

Tropidischia Scudd.

A remarkable long-legged form, the hind tibiæ quadrangulate, with spines on each margin, and represented by a single species.

8. *Tropidischia xanthostoma* Scudd.—Crescent City, Del Norte Co., Cal., Agassiz; Mendocino, Cal., Behrens; Philomath, Benton Co., Oregon, Sept. 15, A. P. Morse.

Ceuthophili.

This group contains the bulk of the Pacific Coast, and indeed of North American, *Stenopelmatinæ*; most of them will be found in my paper on the North American *Ceuthophili* (Proc. Amer. Acad. Arts Sc.,

*It is well to state here that I also overlooked Uhler's genus *Camptonotus*, described in the same paper with *Cyphoderris*. It is identical with Brunner's genus *Neortus*, and has priority.

XXX. 17-113, 1894). One new genus has been established by Sausure and Pictet since its publication, but it may perhaps not be distinct from *Ceuthophilus*. *Hadencæus* Scudd., and *Daihinia* Hald., are the only North American genera not known to occur on the Pacific Coast.

Ceuthophilus Scudd.

Undoubtedly many species of this genus remain to be discovered on the Pacific Coast. The following include all known to me up to the present time :

9. *Ceuthophilus celatus* Scudd.—Originally described from Siskiyou Co.; Shasta Co., San Francisco, and Los Angeles Co., Cal. Mr. Morse brought specimens from Victoria, B. C., Sept. 29, and Divide, Lane Co., Oregon, Sept. 12.

10. *Ceuthophilus agassizii* Scudd.—Recorded from islands in the Gulf of Georgia, between Vancouver and Washington; Vancouver Island, British Columbia, and Oregon.

11. *Ceuthophilus polluticornis*, sp. nov.—Allied to *C. mexicanus* and *C. pallescens*, but much darker than they, castaneous or testaceous, heavily and irregularly mottled with fuscous; hind femora testaceous, dotted with luteous and more or less clouded with fuscous, with a large and conspicuous dark fuscous patch on the lower half of the outer face, at least in the male, the lower margin luteous basally. Antennæ very slender, about or nearly three times as long as the body, luteous or testaceous except basally, where for a distance about equal to the breadth of the body, excepting generally in the female, they are dark rufo-fuscous. The legs are not very slender. Fore femora no stouter than middle femora, about a fifth longer than the pronotum and less than half as long as the hind femora, the inner carina with only a short subapical spine. Middle femora with only a single short spine on either inferior carina, besides the longer subapical spine of the front and the genicular spine of the hind carina. Hind femora not so long as the body and more than twice as long as the fore femora, rather stout and with hardly any equal distal portion, about three (♂) or three and a half (♀) times as long as broad, with but few scattered raised points along the upper surface in the male, the outer inferior carina serrulate, with a rather large preapical spine (♂) or unarmed, with a broad tooth or angulation in place of the spine (♀), the inner spinulose with a similar spine more distant from the tip (♂) or with three or four subapical spinules (♀). Hind tibiæ straight, slightly longer than the femora, armed beneath with a pair of

subapical as well as apical spines; spurs subopposite, the basal pair a little before the middle of the tibiae, scarcely longer than the tibial depth, set at an angle of about 40° with the tibiae, and about 100° with those of the opposite side; inner middle calcaria as long as the metatarsus, twice as long as their mates. Hind tarsi about two-fifths as long as the tibiae, the first joint as long as the rest together, the second twice as long as the third. Cerci tapering regularly, not more than half as long as hind femoral breadth. Ovipositor about four-fifths as long as the hind femora, nearly straight and slender, but apically upcurved and finely pointed, the inner valves very bluntly and feebly crenulate.

Length of body, ♂ 13 mm., ♀ 12 mm.; pronotum, ♂ 3.75 mm., ♀ 4 mm.; fore femora, ♂ 4.4 mm., ♀ 4.75 mm.; hind femora, ♂ 10 mm., ♀ 10.5 mm.; hind tibiae, ♂ 10.5 mm., ♀ 11.25 mm.; ovipositor, 8 mm.

2 ♂, 5 ♀.—Eight-mile Station, about 5,500 feet, on the road from Wawona to the Yosemite Valley, Cal., A. P. Morse.

This species is easily recognized, at least in the male sex, by the antennae discoloured at base and the dark patch on the hind femora.

12. *Ceuthophilus vinculatus* Scudd.—There are specimens in the National Museum from California and Washington, and the Cambridge Museum has a pair, apparently belonging here, from Santa Barbara, Cal.; the species is also found in Nevada, Iowa, and Nebraska.

13. *Ceuthophilus testaceus* Scudd.—A single specimen, apparently of this species, was taken at Los Angeles, Cal., July 29, by A. P. Morse. It had previously been known only from Missouri, Nebraska, and Wyoming.

14. *Ceuthophilus californianus* Scudd.—This has been reported from Vancouver Island, and from many places in California, in Contra Costa, Sonoma, Marin, San Francisco, Alameda, San Mateo, Santa Clara, Santa Barbara, Los Angeles and San Bernadino Counties, as well as from Utah and Arizona. Mr. Morse brought home a specimen from Corvallis, Benton Co., Oregon, taken April 19. (See below, under *Hemiudeopsylla californiana*).

15. *Ceuthophilus pacificus* Thom.—This has been taken by many persons in California without closer specification of locality, and by others in Contra Costa and Los Angeles Counties, and at Lake Tahoe. It also occurs in Nevada.

16. *Ceuthophilus salebrosus*, sp. nov. — Dark luteous, profusely clouded and more or less spotted with dark fuscous. Antennæ slender, fully half as long again as the body, castaneous or rufo-castaneous at base, luteous beyond, about every tenth joint pallid. Legs rather short. Fore femora not stouter than the middle femora, about a third longer than the pronotum and a little less than half as long as the hind femora, the inner inferior carina with a short subapical spine. Middle femora with a single small subapical spine on each inferior carina, besides a genicular spine behind. Hind femora considerably shorter than the body, a little more than twice as long as the fore femora, not very stout, a little less (♂) or a little more (♀) than three times as long as broad, the apical fifth (♀) or sixth (♂) equal, in the male heavily scabrous with minute raised points in oblique rows and especially along the upper margin, the outer inferior carina with an oblique preapical prominent denticle, immediately preceded by obscure serrulation (♂) or obscurely serrulate in distal half (♀), the inner carina distantly, very delicately and minutely spinulose (♀) or with an oblique prominent compressed denticle in the middle of the distal half, preceded by serrulations which almost mount the proximal face of the denticle (♂). Hind tibiæ strongly and sharply bowed just before the middle and so shorter than the hind femora, a little expanded before the bend (♂) or straight, simple, and slightly longer than the femora (♀), armed beneath with a pair of apical and a pair of subapical spines; spurs opposite or subopposite, the basal pair somewhat before the middle of the tibia, about as long as the tibial depth and divaricating but little. Hind tarsi nearly half as long as the tibiæ, the first joint as long as the rest together, the second nearly three times as long as the third and about as long as the fourth. Cerci of female stout in the basal half, beyond tapering, at least two-thirds as long as the hind femoral breadth. Ovipositor nearly straight, gently tapering in the basal half, beyond equal for a brief space, and then tapering more rapidly to a fine point and upcurved, less than two-thirds as long as the hind femora, the inner valves serrulate, with no apical hook.

Length of body, ♂ 10 mm., ♀ 12 mm.; pronotum, ♂ 3 mm., ♀ 3.25 mm.; fore femora, ♂ ♀ 4 mm.; hind femora, ♂ 8.25 mm., ♀ 8.5 mm.; hind tibiæ, ♂ 7.25 mm.,* ♀ 9 mm.; ovipositor, 5 mm.

1 ♂, 1 ♀.—Tenino, Thurston Co., Washington, Sept. 24, A. P. Morse.

The dorsal surface of the abdomen of the male, as in *C. pacificus* and *C. henshawi*, to which this species is closely related, is not smooth as in other species of *Ceuthophilus*, and like them also the fastigium of the vertex is developed as a triangular prominence pushed between the antennal scrobes. In the present species the roughnesses of the abdomen are found from the third segment backward and consist of transverse series of slightly elongated tubercles on the posterior margin of the segments.

17. *Ceuthophilus henshawi* Scudd.—It has been reported from Vancouver Island, Washington, Oregon, and from Placer, Marin, Kern, and Los Angeles Counties in California. It was taken at Tenino, Wash., Sept. 24, by A. P. Morse.

Hemiudeopsylla Sauss.—Pict.

This genus was founded primarily on a Mexican species, to which three others, one from Mexico and two from central California were added. I have been unable to identify the Californian species with anything I have seen, but add them to the list.

18. *Hemiudeopsylla platyceps* Sauss.—Pict.—Marin, Co., California.

19. *Hemiudeopsylla californiana* Sauss.—Pict.—Marin Co., California. This was supposed by the authors to be my *Ceuthophilus californianus* (see above), but their description does not agree with my types, and the specific name must be changed to a new one unless it belongs with some previously described species, which I think improbable.

Phrixocnemis Scudd.

20. *Phrixocnemis validus* Scudd.—California, H. Edwards. Known hitherto by a single specimen only.

Eudeopsylla Scudd.

21. *Eudeopsylla nigra* Scudd.—A single specimen has been taken in El Dorado Co., Cal., 4,000 feet, by Gissler; otherwise it is known only from the region between the Mississippi Valley and the Rocky Mts., in Manitoba, Minnesota, Dakota, Illinois, Iowa, Nebraska, Kansas, Missouri and Colorado, though one specimen has been brought from Arizona.

Gammarotettix Brunn.

22. *Gammarotettix bilobatus* Thom., sp.—This is known only from central and southern California, having been taken in Lake, Sonoma, Marin, San Mateo, Santa Clara, Los Angeles and San Diego Counties.

CHRYSOPHANUS THOE OF GRAY — WHY IS IT NOT
C. HYLLUS, CRAMER?

BY A. G. BUTLER, PH. D., BRITISH MUSEUM, LONDON, ENGLAND.

In my Catalogue of Fabrician Diurnal Lepidoptera, p. 173, I (in 1869) unhesitatingly identified examples of a *Chrysophanus* in the British Museum collection with Cramer's *Papilio hyllus*, and at the present time I do not see the slightest valid reason for altering that decision.

In his "Butterflies of the Eastern United States," Dr. Scudder, at the end of his synonymy of *Chrysophanus thoe*, says, "Not *Papilio hyllus*, Cram."; but, in his account of the species, I find no reason adduced for this assumption, though I can readily believe that the incorrect locality, "Smyrna," given by Cramer, and the somewhat careless drawing of the spots across the disk of primaries, may have influenced him.

That *C. hyllus* is not a European type, in the Staudingerian sense of the term, may be concluded from the fact that it is excluded from Staudinger's Catalogue, and I think I may safely affirm that there is no European species which at all nearly approaches it. On the other hand, anyone acquainted with the utter unreliability of many of Cramer's localities for his species, and with the unequal merit of his drawings, would have no hesitation in at once pronouncing his figures of *P. hyllus* to be a representation of the female of *C. thoe*.

If *C. hyllus* and *C. thoe* are not one and the same species, what is Cramer's insect? Ruhl, in his "Palæarktischen Gross-schmetterlinge," 1892, ignores it entirely; indeed, by general consent, the students of European and allied butterflies are decided as to its having nothing to do with the fauna of Asia Minor or Europe.

If, therefore, *C. hyllus* is not *C. thoe*, it must be an extinct species closely related to the latter, for there is nothing else in the least approaching it. If this conclusion commends itself to American Lepidopterists, well and good, but they must not mind being classed with those who consider it "folly to be wise."

CABINET PEST DETERRENT.

One of the most worrying things an entomologist has to put up with is that after carefully making a collection his most valued specimens are nearly eaten away, either with mites or the *Dermestes* beetle.

For the benefit of my brother enthusiasts, let me give briefly my personal experience. Last June captures at light were very good and numerous. Many rare insects were taken and set out. The setting-boards were placed on a shelf. By the morning the contents of three boards were literally eaten away by large black ants, house flies, and the little black and orange beetle. If my thoughts had been candidly expressed I am afraid my reputation would have been irretrievably lost, so I hunted around for a remedy and was soon successful in finding one.

The ingredients are —

Corrosive Sublimate, 2 dr.;
Turpentine, $\frac{1}{2}$ oz.;
Rectified Spirits of Wine, $3\frac{1}{2}$ ozs.

These are simply mixed together.

Directions.—First shake the bottle briskly. Take a small camel's-hair brush and apply a thin streak of this preparation under the body of each insect, taking care not to touch the wings. (Better try the effect on some common moths first.)

Now comes the test of ten months. The preparation was applied to several *Cecropias*, while others were placed beside these without being so treated. These were all laid on a shelf. Next morning the bodies of the unprepared moths were mere shells. Ants and beetles were having no end of a feast. Not so with the others. They are there yet and not a sign of a mite, beetle or ant to be seen.

As regards boxes, cabinets, etc., apply a thin line of the preparation all around the sides, forming, as it were, a cordon. No other chemical is required in the cabinet.

If specimens are already infected run some gasoline into the boxes and close them up. This will kill the larvæ and mites in a few minutes. Camphor is utterly useless. In re-papering setting-boards or drawers use a little of the solution in the paste. Be careful not to use methylated spirits.

A. E. NORRIS, Montreal.

BOOK NOTICES.

DR. SKINNER'S CATALOGUE OF NORTH AMERICAN BUTTERFLIES.

It is now nearly fifteen years since Mr. W. H. Edwards issued his "Revised Catalogue of the Diurnal Lepidoptera of America north of Mexico," and it cannot therefore be said that the new "Synonymic Catalogue of the North American Rhopalocera," issued on 15th December last by Dr. Henry Skinner, appeared prematurely. In this catalogue, Dr. Skinner has followed very closely on the lines laid down by Mr. Edwards in his lists, so far as the species are concerned, and with a conservatism which is striking when compared with his rather sweeping radicalism as expressed in his article, "Impressions Received from a Study of our North American Rhopalocera," in Jour. N. Y. Ent. Soc., IV., 107. A few, probably too few, species have been placed in the synonymy, but it seems strange, in view of what the author has written elsewhere, to see *Argynnis* Artonis, *Clio*, *Opis*, *Bischoffii*, *Arge* and *Eurynome*, all standing as distinct species. The order of the families and subfamilies has, however, been entirely changed, following that adopted by the same author in the Check List of 1891, beginning with the *Danainæ*, and the other *Nymphalid* subfamilies following in order the *Satyrinæ* and *Libytheinæ* closing the series, the *Erycinidæ*, *Lycænidæ*, *Papilionidæ* and *Hesperidæ* following in the order given.

This grouping of the families, if not altogether satisfactory, and it is not so to the reviewer, seems certainly much more reasonable than that which places at the head as the highest type of butterfly the *Satyrinæ*, some of the species of which pupate in rudimentary cocoons.

One very excellent feature of the work is the giving a separate line to each reference, which greatly aids the eye in finding what is wanted, but more care might have been exercised in giving the references, as quite a number of errors in the volumes or pages occur. One such error, which may be cited as a sample, occurs on page 52 under *Chrysophanus Dorcas*, where Scud. But. 3, 1380, should be 1830.

Other misprints occur, at least it seems probable that spelling *Phæton* *Phæton* is chargeable to the printer rather than to the author.

In a few cases references are given which are of less interest than some which have apparently been overlooked, but the citations are so very full that really very little of interest seems to have been omitted.

It will be noticed that under *Colias Palæno* is placed Var. *Werdandi*,

Herr-Schaff. This is following the supplement of Kirby's Catalogue, but Dr. Staudinger and Mr. Elwes give Var. Werdandi, Zett., as a variety of *Colias Nastes*, Boisd.

The lists of authors and of works quoted are very complete, and the index giving both species and genera, the latter in heavy type, is very satisfactory. Altogether it is a most useful work and really indispensable to every worker on the North American Rhopalocera. It is issued by the American Entomological Society as part of their Transactions, but may be obtained separately from the author for \$1.00. H. H. L.

CONTRIBUTIONS TO THE THEORY OF WARNING COLOURS AND MIMICRY.

—By Frank Finn, B.A., F. Z. S., Deputy Superintendent of the Indian Museum, Calcutta. (Reprint from the Journal, Asiatic Society of Bengal.) Vols. LXIV., LXV., LXVI., LXVII., Part II., 1895-97.

In this little book of 84 pages, Mr. Finn has brought together a number of separates of his papers, printed in the Journal of the Asiatic Society of Bengal, on this very interesting subject. The experiments were made, largely, with birds, but a lizard, *Calotes versicolor*, was used in one series, and a frog, *Rana tigrina*, and a Tree-Shrew, *Tupaia ferruginea*, in another series; in this last only a single individual of each species being used. The insects experimented upon were mainly butterflies, including largely, of course, such as are supposed to be distasteful or warningly or protectively coloured.

It is obviously impossible to go into the details of the many experiments carried out by Mr. Finn, and, therefore, only a synopsis of the results obtained are included here. As regarding the, in some instances, somewhat unsystematic experiments in the case of birds, Mr. Finn explains that "experimenting on this subject was not always his main object in keeping the birds at all," which leads us to suppose that, sometimes at least, the results given are what might be termed bi-products, which, instead of detracting from their value, might be regarded as adding thereto, as he would certainly be free from all mental bias, so difficult to avoid in cases where one has laboured long and intensely on a very interesting problem.

In regard to the lizard, *Calotes*, he states that "the behaviour of these certainly does not appear to afford support to the belief that the *butterflies*, at any rate, usually considered nauseous, are distasteful to them."

In regard to the *Tupaia*, Mr. Finn states that this animal has a very strong objection to the "protected" *Danainæ* and *Papilio aristolochie*, as it so constantly refused them, and in case of the former, absolutely, and not, as with the birds, merely showing dislike by preferring other species. Of the tastes of the frog, sufficient data was not obtained to warrant any conclusions.

Regarding birds (the Babblers especially) the author concludes as follows :

"1. That there is a general appetite for butterflies among insectivorous birds, even though they are rarely seen when wild to attack them."

"2. That many, probably most species, dislike, if not intensely, at any rate in comparison with other butterflies, the 'warningly-coloured' *Danainæ*, *Acraea violæ*, *Delias eucharis*, and *Papilio aristolochiæ*; of these the last being the most distasteful, and the *Danainæ* the least so."

"3. That the mimics of these are at any rate relatively palatable, and that the mimicry is commonly effectual under natural conditions."

"4. That each bird has to separately acquire its experience, and well remembers what it has learned."

"That therefore on the whole, the theory of Wallace and Bates is supported by the facts detailed," in these papers, "so far as they deal with birds (and the one mammal used)." "Professor Poulton's suggestion that animals may be forced by hunger to eat unpalatable forms is also more than confirmed, as the unpalatable forms were commonly eaten without the stimulus of actual hunger—generally," he adds, "without signs of dislike," which shows that, under the stress of hunger, they would likely exhibit even less nicety of selection.

To future experimenters, Mr. Finn offers the following hints, derived from his own experiments :

"1. Use animals at liberty for experimenting with if possible."

"2. If these are not available, confine your subjects singly, and feed them well and *naturally*, letting them be neither hungry nor pampered. Cages should be of portable size (about two feet every way) and made (for birds) of half-inch mesh wire netting with plain wooden floor without a tray. This is to prevent insects from getting out or being concealed."

"3. Use wild-caught specimens in preference to hand-reared ones."

"4. Remember that the best and often the only way to determine an animal's tastes is to offer it a choice."

F. M. WEBSTER.

CORRESPONDENCE.

LARVÆ OF XYELIDÆ.

SIR,—The Wiener Ent. Zeit. for March, 1899 (Vol. XVIII., p. 41), publishes an article by Mr. F. W. Konow, in which my description of *Pleuroneura avingrata* is attacked. I do not desire to enter any controversy in which the use of abusive language prevails, but as Mr. Konow asks some direct questions about the larva, I propose to answer them for his information. 1. The abdominal feet are present on all the segments, but quite small on the first and ninth, so that from the living larva I did not describe them on these segments; in the inflated larva they are fairly distinct. Compare Mr. Young's description of *Macroxyela ferruginea* (CAN. ENT., XXXI., 41), where the feet are even more prominent. 2. There are no anal stylets present. 3. The antennæ are 6-jointed, situated just below and a little inward from the eyes. 4. The palpi are visible on the outside of the jaws when these are closed. 5. The length of the mature larva is about 27 mm. 6. Mr. Konow asks how the larvæ may be distinguished from the Lydidæ. I refer to my definition of the Xyelids, CAN. ENT., XXX., 176.

HARRISON G. DYAR.

Department of Agriculture,
Victoria, B. C., Feb. 28th, 1899.

To the Editor Canadian Entomologist:

SIR,—I have read with much interest Prof. Enzo Reuter's article in the January number of the CANADIAN ENTOMOLOGIST, referring to the occurrence of the apple fruit miner, *Argyresthia conjugella*, in Finland, and I think the enclosed letter from Prof. Matsumura, of Japan, may prove of interest to the readers of the CANADIAN ENTOMOLOGIST. You will notice that his account of the Japanese pest, particularly with regard to its attack, tallies very well with what we have observed in British Columbia. The cocoon sent by Prof. Matsumura I am saving, and hope to succeed in breeding the imago next spring. I am unable to determine positively by the cocoon if the insects are identical. I think that the important point as to the mode of egg-laying must be determined before we can feel satisfied with our knowledge of it. All of Prof. Reuter's notes are of great interest to us here, but I cannot help thinking that the mention made of this insect attacking plums is a mistake, some observer having probably confounded the larvæ of *Semasia prunivora* with those of *Argyresthia*.

E. A. CAREW-GIBSON.

Imperial Agricultural College,
Sapporo, Japan, Dec. 7, 1898.

DEAR SIR,—I have duly received your letter. Dr. J. Fletcher, of Ottawa, Canada, has already suggested to me that *Larverna herellera* might be identical with your British Columbian *Argyresthia conjugella*, Zell. I have received from him a report concerning it, and am convinced that it must be quite identical. The mode of affecting the plant differs from that of yours, as I have mentioned in a paper published by the U. S. Division of Entomology (Bull 10, U. S. Div. of Ent., 1898), but some larvæ in this country seem to attack the fleshy part of the apple just in the same way as the larvæ of *Trypeta* do, tunnelling in every direction, especially through the superficial part of fruits, and disfiguring them. When an apple is attacked by these larvæ, this fact is manifest on the outside of the fruit by a dusky green track, somewhat depressed, over the tunnels.

Owing to a very wet season this year the insects were scarce, so that I could not obtain many specimens to rear, but I send you a single specimen of the cocoon, which may be of use for identification. I do not think that this insect is indigenous in Japan, but has probably been introduced from some foreign country. Formerly I thought that it must have been introduced from your country, until I was informed by Messrs. Howard and Fletcher that this was very unlikely. *Carpocapsa pomonella*, *Schizoneura lanigera*, *Mytilaspis pomorum*, *Coleophora malivorella*, and *Cacasia rosaceana*, etc., have all been introduced here from America, and are all of them doing much damage to our horticulturists. I am not yet positive where the eggs are laid, but the first trace of entrance is always on the side, so I naturally assume that the place where the eggs are laid must be on the side. In Sapporo the earliest varieties of apple, such as Fameuse, Red Astrachan, etc., are more liable to be attacked, and the late varieties are less injured. The season during which fruit is liable to injury continues from June to November. I have often found the insect in stored apples even as late as the end of November.

The spraying of trees against this insect is not practised, but in autumn the ground under the affected trees is scratched and raked, so as to expose the cocoons to thawing and freezing. The cocoons are not very deep in the ground, at most about two or three inches. Last year I sent Dr. Howard a single specimen of the imago, and regret that I have not any other good duplicates on hand, but I will send you some next spring if I am successful in rearing. Yours truly,

M. MATSUMURA, Asst. Prof. of Entomology.

To E. A. Carew-Gibson, Victoria, B. C.

Mailed May 3rd, 1899.

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No. 6.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

TORONTO BRANCH.

At the third annual meeting of the Toronto branch of the Entomological Society of Ontario, held in the Normal School Building, on Friday, April 7th, Vice-President Tyers in the chair, the officers were elected for the ensuing year as follows: President, Mr. Arthur Gibson; Vice-President, Mr. E. M. Walker; Secretary-Treasurer, Mr. G. M. Stewart (233 Beverley street); Librarian, Mr. H. C. Austen. Members of Council—Messrs. R. J. Crew and S. R. Carter. The retiring President's address, as read by the Secretary, contained some good suggestions, which, if carried out during the present year, will create more interest in the meetings and be of much benefit to the members.

QUEBEC BRANCH.

The second annual meeting of the Quebec branch was held on Saturday, April 15th, in Morrin College, under the presidency of the Rev. Dr. Fyles. There was a large attendance of members and several new ones were admitted to the branch, raising the number to upwards of forty. The Treasurer's report, which shows a good balance on the right side, was read and adopted.

After the President had delivered his annual address, which was full of interest, the election of officers for the ensuing year took place, and resulted as follows: President, Rev. T. W. Fyles, D. C. L.; Vice-President, Miss Macdonald; Secretary-Treasurer, Lt.-Col. Crawford Lindsay; Curator of Museum, Professor Walters. Council—Hon. Richard Turner, M. L. C., Mr. James Geggie and Mr. J. Eveleigh Treffry, Mrs. R. Turner, Miss Bickell, and Miss B. Winfield.

MONTREAL BRANCH.

The twenty-sixth annual meeting of the Montreal branch was held on May 9th, at 74 McTavish street. The President, Mr. Henry H. Lyman, occupied the chair, and ten members and one visitor were present.

The President submitted the annual report of the Council, which recorded with satisfaction the continued success of the branch, alluding to the successful celebration of its twenty-fifth anniversary in November last. Eight meetings had been held during the season and fourteen original papers read. Several of the members had again assisted the Natural History Society in its course of Saturday half-hour lectures to young people.

The Treasurer's report showed a substantial balance on hand, and, on motion, these reports were received and adopted.

Mr. Lyman then delivered his annual address, making it his valedictory, on retiring from the presidency. He reviewed in an interesting manner the past history of the branch, giving statistics to show the progress made and thanking the members for assistance in carrying on the work.

The election of officers was then proceeded with, with the following result: President, Mr. Albert F. Winn; Vice-President, Mr. Dwight Brainerd; Secretary-Treasurer, Mr. Lachlan Gibb (re-elected). Council—Messrs. Henry H. Lyman, G. C. Dunlop, and A. E. Norris.

The retiring President then vacated the chair, which was taken by the new President, who read an interesting paper on "Collecting by Electric Light."

After spending a half-hour pleasantly in the examination of the specimens exhibited by various members and in discussion, a very successful meeting was brought to a close.

FATAL TEMPERATURE FOR *DIASPIS AMYGDALI*, TRYON.

In the CANADIAN ENTOMOLOGIST, Vol. XXX., pp. 78-80, the writer of this stated that a tree imported from Japan, and badly infested by this Coccid, had been transplanted to the insectary, but the other of the two trees mentioned was not, at that time, properly accounted for. It was planted outside, with a view of ascertaining the lowest degree of temperature that the *Diaspis* could withstand and not be destroyed. The lowest temperature reached in the winter of 1897-98 was -9° Fahr., but, notwithstanding this, the species wintered over in sufficient numbers to increase considerably over the previous year. During the winter of 1898-99, just passed, the temperature fell to -21° Fahr. during a single night and to from -12° to -18° Fahr. for several successive nights, with the result that the *Diaspis amygdali* appear to have every one succumbed, as not a single living individual can be found on the tree. F. M. WEBSTER.

TWO NEW COCCIDÆ OF THE SUBFAMILY LECANINÆ.

BY ADOLPH HEMPEL, S. PAULO, BRAZIL.

EDWALLIA, n. g.

Apparently related to *Farmairia*, Sign. ♀. Scale waxy, hard, brittle, cone-shaped with radial ridges and furrows. Antennæ five-jointed. Anal-plates curved; the two together forming a ring. Each plate is furnished with ten long hairs. Type, *E. rugosa*.

Edwallia rugosa, n. sp.

♀.—Scale white; wax hard and brittle, cone-shaped, having the appearance of a barnacle, and radially ridged or fluted like the shell of *Pecten*. The base is slightly oval in shape, being wider anteriorly than posteriorly; the anterior side is slightly convex, so that the top of the scale is caudad of the middle. A number of fine concentric rings run around the scale parallel to the base. The inside of the scale is shiny and quite smooth. Adult ♀ fills the entire scale. Derm smooth, lemon-yellow in colour. Around the margin of the body there is a row of about 210 small sharp conical spines, and near the margin on the dorsal surface there is a double row of minute hairs. The stigmatal areas are characterized by one large curved spine, with a round spot at the base; and by a group of from 13 to 19 small round glands. The caudal cleft is very short, each lobe bears a hair longer than the marginal spines. Anal orifice surrounded by a chitinous ring, within which is the anal ring bearing six long hairs. Anal plates curved, irregular, triangular, the dorsal side longer than the ventral side. Each plate bears 10 long hairs, two of which are straight and spinelike; the others are longer and more flexible. Three are situated on the dorsal surface and 7 on the ventral. The plates are so placed that they together form a second anal ring with 20 hairs. Just in front of the anal ring there is a group of about 20 small round spinnerets. Antennæ five-jointed, .12 mm. long. Joint 3 the longest; joints 1 and 5 are about equal in length; joint 4 is about half the length of 3; and joint 2 is the shortest. Formula 31542, or 3(15)42. All the joints bear hairs; joint 3 bears two, one of which is quite long; joint 5 has five hairs. Legs ordinary, coxa and trochanter each with a subterminal hair. Femur wide, with a short sharp spine near the distal end; tibia about as long as femur, the distal end enlarged and bearing one hair; tarsus and claw not quite as long as tibia, two hairs on

the extremity of the tarsus; claw small, curved. Tarsal digitules very long and slender, with expanded ends; digitules of claw about half as long as the others, ovate leaf-like. Mentum large, situated midway between the first and second pairs of legs; rostral loop reaching half way to the third pair of legs. Viviparous. ♀ Scale: height, 3.00 mm.; width, 1.50 mm.; length, 2.75 mm.

Larva, just hatched.—Light yellowish-brown, ovate, margin serrated; abdomen ending in two inconspicuous lobes, each bearing one long terminal hair. Anal ring with six long hairs; two short hairs are on the abdomen just in front of the anal ring. The two anal plates are indicated, each with about 6 small hairs. The prothorax and mesothorax each bear a short thick spine on each side of the body. Antennæ apparently five-jointed; joints 5 and 3 being about equal in length. All the joints bear hairs, joint 5 bearing six, one of which is as long as the antennæ. Legs long; trochanter with one long subterminal hair; all the other joints with two hairs or more; claw long and slender, digitules of unequal length, slightly expanded; digitules of tarsus very long, hair-like. Four or more longitudinal rows of short spines on the dorsum.

♂.—Scale white, very thin, Lecanid, elliptical, not very convex. Divided into plates, one dorsal, two lateral on each side, and one terminal at each end. The dorsal plate has a crest of broken wax. Length, 1.75 mm.; width, .75 mm.

Hab.—Sao Paulo, Brazil. On the small twigs of *Eugenia jaboticaba*, a tree found in the Brazilian forests, and cultivated for its fruit. I am indebted to Mr. Gustav Edwall for this species. He first found it and called my attention to it. It is not abundant.

PULVINELLA, n. s. g.

Like *Pulvinaria*, except that the ovisac is secreted below the insect, instead of behind it. The ovisac is cone-shaped, and when it is completed, the insect rests upon it like on a cushion.

Type *Pulvinaria* (*Pulvinella*) *pulchella*, n. sp.

Pulvinaria (*Pulvinella*) *pulchella*, n. sp.

♀ *Adult*.—Shiny, hard, elliptical, dorsum not very convex; ground-colour dirty white, marbled with black on the ridges near the margin. Derm irregularly transversely wrinkled; one prominent ridge extends across the dorsum, slightly anterior of the middle. Beneath, chocolate-

brown, except a narrow marginal stripe of dirty white. Caudal cleft about 1 mm. long. Boiled in a solution of KOH, it colours the liquid a dark amber. Antennæ 8-jointed, .48 mm. long. Joint 3 the longest; joints 4 and 5 considerably shorter; joints 1 and 2 about half as long as 3, and the other joints shorter. Formula 3(45)12867. All joints except joint 3 bear hairs. Legs ordinary, coxa with several hairs, and one short, sharp spine near the proximal end; trochanter with one very long apical hair and two short ones; femur stout; tibia not quite so long as femur; tarsus half as long as femur; claw long, stout, curved. Tarsal digitules very long, slender, with knobbed ends; digitules of claw not twice the length of claw, stout with expanded ends. Mentum situated between the fore legs; rostral loop long, reaching half way to the insertion of the last pair of legs. Anal ring with ten long hairs. There is a single marginal row of rather long, slender hairs. Stigmatal spines three, one long, slightly curved, two short and stout. A group of about 50 small round spinnerets is situated around each stigmatal area. Numerous filiform glands are scattered over the ventral surface. Anal plates small, both lateral sides being of equal length. Height, 2 mm.; width, 4.50 mm.; length, 6 mm.

Ovisac cone-shaped, longitudinally fluted with about 16 ridges. The anterior part is secreted faster than the posterior part, so that the anterior edge becomes convex, and when it is completed the insect rests upon it in an oblique position. The ridges are closer together on the posterior edge than on the anterior. The colour is white with a faint creamy tinge. Length, 5 mm.; width, 3.75 mm.; height, 7 mm.

Larva, just hatched.—Light brown, elliptical. Margin of body finely serrated; a short hair is situated on each side of the body at each abdominal segment; eight short hairs on the anterior margin between the antennæ. The body is terminated posteriorly by two long setæ and several small hairs. The prothorax and mesothorax each bear a long, straight spine, on the margin, on each side of the body. Antennæ long, six-jointed, three the longest, and six the next; the other joints subequal in length. Legs ordinary, tarsal digitules long, slender, with slightly expanded ends; one of them as long as tarsus. Claw long, curved; digitules of claw slender, with expanded ends. Rostral loop long, reaching to the anal cleft.

Hab.—Ypiranga, State of Sao Paulo, Brazil. On small twigs of *Baccharis*, sp. Not common.

SOUTHERN NOCTUIDS AT RYE, N. Y.

BY HENRY BIRD, RYE, N. Y.

Remarks in a recent issue of this magazine concerning "A Southerner arrested in Canada" recall some of the additions made to my local list during the summer of 1898. In this instance also some stragglers from a lower latitude were welcomed among my catch. Not only a few Noctuids but some of the birds also bore a Southern aspect (I cannot be expected to pass the birds unnoticed), most unusual among the latter being the appearance of several blue herons that frequented the salt marshes here for the better part of the summer. These waders are more at home in the swamps of Florida, although this is not the limit of their northern migrations by any means, yet they are considered great rarities here by the local sportsmen.

Whether the climatic conditions were such as to induce the visitations, or whether the great quantity of gunpowder that was burned down South caused them to be in evidence, I will not attempt to explain.

In the case of the heron the gunpowder suggestion might have a little weight, but the freshness of my Noctuids points rather to a permanent residence on their part.

Worthy of especial mention among these is *Eucalyptera bipuncta*, Morr.

In the only previous reference to this species in former volumes (Vol. XV., 230) the insect is discussed concerning its position generically and is compared with *Scolecocampa liburna* and *Doryodes acutaria*. As one unfamiliar with the species could get but a poor conception from these associations, and as the literature is in no way burdened with references to this insect, I will mention a few points descriptive of its general appearance.

In my specimen, a male, the form is very slight, palpi prominent projecting forward and upward, the antennæ show extremely fine pectinations under a pocket magnifier. The colour is light smoky gray, the secondaries a trifle the darker. The transverse posterior line is the only conspicuous marking of the primaries, is strongly indicated, smoky brown, and curves well outwardly near the costa, but does not in my specimen reach the costal vein.

Two small, black dots, suggestive of the name, are noticeable, one—the larger—indicating the orbicular, and the other, very minute, equi-

distant between it and the t. p. line. The secondaries are without markings. The insect expands twenty-two millimeters, and was taken at light, Aug. 10th.

Another species of perhaps rarer occurrence was *Atethmia rectifascia*, Grt. My acquisition of the latter was in this wise: While assisting a lady friend, who had just begun collecting, in naming a very fair two-months' catch one evening last August, our attention was drawn to a small moth that had flown in at the open window and was resting on the window shade. The question, "Oh! what is that one?" was too much for the oracle, and with an apologetic hint that it was something very good, I was presented with the specimen for further deliberations.

Here was another instance of the good luck that generally befalls beginners in having rarities come their way. I have noticed it repeatedly and recall my only capture of *Eutelia pulcherrima*, Grt., in the earliest days of my entomological experience.

How it is that the specimen which I still possess has passed through the vicissitudes of the "cigar-box" collection, the ornamental display case on the wall, and lastly the transference from an unusually large, common pin, is more than can be imagined. And yet it stands a very passable example in my collection, antennæ-less and leg-less to be sure, but for all that the most prized specimen that I have.

Through the last ten years, since knowing what species it represents, a constant lookout for others has been kept, but without success, and I have begun to wonder if it will be necessary for me to begin all over again in order to secure another example.

Regarding *rectifascia*, a word as to appearance may not be amiss, as no mention of the species has thus far been made in the CANADIAN ENTOMOLOGIST. Since its description in 1874, the generic position has been twice changed by Prof. J. B. Smith, to whom I am indebted for the identification of my example. This species is of rather slight build, with wings full and normally developed, having a thin, silky vestiture that at first suggested to me (very wrongly) that it might have a position somewhere *Acontia*-ward. The antennæ are simple, eyes and palpi prominent, the latter projecting upward. The primaries are a pale, shining olivaceous, crossed by three lines or fasciæ, as in the case of *Chloridea rhexia*, S. & A. The first of these, which is nearer the middle of the wing than usual for the transverse anterior line, is about at right angles

with the inner margin. The second or transverse posterior line is more oblique, bending outward near the costa and with a more pronounced sweep than the following. The third or subterminal is margined inwardly with a faintly darker shade of the ground-colour. The extreme outer margin and fringes show a golden lustre. The reniform is indicated by a straight mark of the same pale shade as the lines, and is at right angles with, though not touching, the costa. At the outer margin, near, but not on, veins three and four are two minute black dots. In a description of this insect in Trans. Am. Ent. Soc., X., 247, no mention is made of these dots and they may be perhaps a sexual characteristic.

The secondaries are lighter, discoloured white, of the same lustrous sheen, shading darker at the outer margin, but with fringes less golden than primaries. Expanse, twenty-four millimeters.

Other captures, referable generally to a more southern fauna, are *Polygrammate hebraicum*, Hbn.; *Laphygma frugiperda*, S. & A.; *Prodenia eudiopta*, Gn.; *Plusia basigera*, Walk.; *Schinia lynx*, Gn.; *S. Thoreani*, G. & R.

WINTER BREEDING OF DIABROTICA VITTATA IN FORCING HOUSES.

In the "Journal of the New York Entomological Society" for June, 1896 (Vol. IV., No. 2, p. 68), the present writer recorded the occurrence, on December 28, 1895, of adults, and larvæ from one-half to two-thirds grown, of *Diabrotica vittata*, in a greenhouse near Cincinnati, Ohio, that was being used for growing cucumbers for winter market. The injuries inflicted upon the young cucumber plants were very serious, and resulted in a nearly total destruction of the plants. On March 25, 1899, serious injuries were again reported by the proprietors of these same greenhouses, and the complaint was accompanied by specimens of what, to all appearances, were the larvæ of this same species. These larvæ were placed on the roots of a squash plant growing in the insectary, and on the morning of April 24th the adults made their appearance, thus showing that, under proper conditions, the species will continue to reproduce the year round, whereas out of doors, and under normal conditions, the insect hibernates in the adult stage. F. M. WEBSTER.

DR. A. FENYES, of Pasadena, California, has set forth on a collecting tour in Mexico, Texas, New Mexico and Colorado, and expects to be absent for five months.

THE SYNHALONIA OF CALIFORNIA.

BY CARROLL FOWLER, BERKELEY, CAL.

The material for this study was collected by Mr. H. O. Woodworth and myself during the spring and early summer of 1898. At Berkeley the collecting was carried on in a systematic manner, so that the number of each species taken gives a fair representation of their relative abundance. *S. albicans* and *S. Edwardsii* are the only species heretofore recorded from California. The species may be readily recognized by means of the following synopsis :

Abdomen with distinct, white bands.

Small, not more than .25 in. in length.....*albicans*.

At least .40 in. in length.

Thorax with white pubescence, rather thin on

disc.....*californica*, ♀.

Thorax with dense, reddish-brown pubescence....*speciosa*, ♀.

Abdomen not distinctly banded.

Pale pubescence of the abdomen confined to the first segment.

Thorax with dense, brownish pubescence.....*acerba*.

Thorax with rather thin white pubescence.....*albopilosa*, ♂.

Pale pubescence extending more or less upon second abdominal segment.

Third joint of the antennæ shorter than the first.....*Edwardsii*, ♂.

Third joint as long as the first and second combined...*intrudens*, ♂.

1. *Synhalonia albicans*, Prov. San Gabriel, Cal. (H. O. Woodworth), June 23. Twelve specimens.

2. *Synhalonia californica*, n. sp.

11 mm. Clothed with ashy pubescence, abdomen with white bands.

♀.—Head black, clothed with ashy pubescence; clypeus nude, coarsely punctured; antennæ entirely black. Thorax black, opaque, very finely punctured, clothed with ashy pubescence, a little thinner on the disc; tegulæ reddish-yellow; wings very slightly clouded; legs clothed with white pubescence, dense on posterior tibiæ and tarsi, more or less yellowish on tarsi beneath; apical joints of tarsi brownish. Abdomen black, very finely punctured, narrow apical margins of the segments brownish; first segment clothed with erect pale hairs, on base of second indistinct and sometimes wanting, and on apical margins of 2-5 a band of white appressed pubescence, brownish on middle of fifth. Ventral segments fringed with white hairs.

Habitat.—Berkeley, Cal., May 1 and 9. Thirteen specimens.

3. *Synhalonia speciosa*, Cress. Berkeley, Cal., April 26 to May 1. Two females. Previously recorded from Colorado.

4. *Synhalonia acerba*, Cress. ♀.

♂.—Differs from ♀ in having the clypeus and labrum yellow, the antennae reaching back to the second abdominal segment and crenulated toward tips (third joint is shorter than the first), and the legs clothed with pale pubescence. The pubescence of the thorax, as in some females, is strongly tinged with fulvous. The male is readily distinguished from *Edwardsii* by having no pale pubescence on the second abdominal segment.

Berkeley, Cal., six specimens; and San Mateo Co., Cal., two specimens. April and May. Collected upon *Brassica campestris* and *Ranunculus californicus*. Previously recorded from Nevada.

5. *Synhalonia albopilosa*, n. sp.

13 mm. Thorax small, clothed with white pubescence; abdomen large, oval.

♂.—Head black, punctured, clothed with griseous pubescence, thin on clypeus; clypeus, except upper margin, and labrum, yellow; antennae entirely black, reaching slightly beyond the second abdominal segment, crenulated toward tips, third joint shorter than the first. Thorax black, finely punctured, not as broad as abdomen, clothed with rather long, white pubescence, not entirely concealing the surface; tegula black in front, brownish behind; wings hyaline; legs clothed with pale pubescence, apical joints of the tarsi brownish, intermediate tarsi long and slender. Abdomen oval, broader than the thorax, black, shining, finely punctured, apical margins of the segments pale brown; first segment with thin, erect, white hair, 2-5 with short, thin, black pubescence, a very little white on the sides of the second, and that on 6-7 dark brown. Venter almost nude, otherwise as above.

Habitat.—Berkeley, Cal., April 18. One specimen, collected upon *Ranunculus californicus*.

6. *Synhalonia Edwardsii*, Cress. Berkeley, Cal., March 15 to May 9. Sixteen males, collected upon *Brassica campestris*, *Ranunculus californicus*, and *Malvastrum capense*, in botanic garden.

7. *Synhalonia intrudens*, Cress. Berkeley, Cal. March, fourteen males; and April 26, one male. Tulare, Cal. (H. O. Woodworth), May 10, three males. Collected chiefly upon *Brassica campestris*. Previously recorded from Nevada.

CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.—II.

BY GEO. B. KING, LAWRENCE, MASS.

Ortheziinae.

- (21) *Orthezia insignis*, Dougl. ; 1887-1892. I.

Found at Amherst and Cambridge, Mass., in greenhouses. A very general feeder on greenhouse plants. It is recorded from New York, Pennsylvania, and California.

Lecaniinae.

- (22) *Kermes galliformis*, Riley ; 1881-1897. N.

A very abundant species at Lawrence, Methuen, Andover, Haverhill, and Dracot, Mass., on white, black, red, and scrub oaks. It is recorded from Ohio, Colorado, New Mexico, New York, and Oklahoma. In Massachusetts it is attacked by a Lepidopterous larva, *Euclemensia bussettella*, and a new species of *Encyrtus* has been reared from it in large numbers. It is attended by a number of species of ants, the following already observed : *Formica subsericea*, Say. ; *F. obscuripes*, For. ; *Camponotus pennsylvanica*, Deg. ; *Cremastogaster lineolata*, Say. ; and *Lasius americanus*, Em. In the spring of 1898 one adult female was found under a stone in a nest of *Formica subsericea*, Say, at Andover, Mass.

- (23) *Kermes pubescens*, Bogue ; 1898-1898. N.

This is found to be quite destructive to young white oaks at Lawrence, Andover, and Methuen, Mass. It is parasited by *Microterys cincticornis*, Ashm. The coccid was first described from Kansas.

- (24) *Kermes nivalis*, King and Ckll. ; 1898-1898. N.

A very pretty species and comparatively rare. Covered with a snow-like meal which soon disappears after the young begin to move about. It is found on *Quercus alba* at Lawrence, Mass.

- (25) *Kermes Kingii*, Ckll. ; 1898-1898. N.

Like the above, quite rare and handsome. Found at Lawrence, Mass., on red oak. Prof. Gillette has sent Prof. Cockerell specimens collected in Delaware.

- (26) *Lecanopsis lineolata*, King and Ckll. ; 1897-1897. N.

Found in the nest of *Cremastogaster lineolata*, Say, at Lawrence, Mass.

- (27) *Lecanium hesperidum*, L.; 1758-1828. I. Described as *Coccus hesperidum*.

Very common in greenhouses, and a pest not only in greenhouses, but also to many plants in dwelling houses at Lawrence, Mass.; on ferns, palms, ivy, and many other plants not yet identified; recorded from Utah, Ohio, California, Florida, Georgia, New York, New Jersey, and Washington, D. C.

- (28) *Lecanium coffeæ*, Walk.; -1896. I. Syn. *hemisphaericum*, Targ.

A first-class pest on greenhouse plants at Lawrence, Mass.; on ferns and several other plants not determined. It is reported from Cambridge, Maine, New Jersey, New Mexico, California, Pennsylvania, and Washington, D. C., on Orange, Diospyros, Oleander, Chrysophyllum, Sago palm, and *Croton variegatum*.

- (29) *Lecanium quercifex*, Fitch. 1856-1898. N.

On white oak at Lawrence, Mass. Parasited by a new species of *Coccophagus*. Originally described from New York.

- (30) *Lecanium quercifex*, Fitch, var.; 1898. N.

At Methuen, Mass.; on cork oak and an ornamental shrub. It is parasited by *Aphycus lecanii*, How.

- (31) *Lecanium filicum*, Boisd.; 1868-1869. I.

According to Dr. Packard it has been found in greenhouses frequently. Prof. Cockerell informs me that this is only a variety of *L. coffeæ*.

- (32) *Lecanium corylifex*, Fitch; 1856-1898. N.

A very common species at Lawrence, Andover, and Methuen, Mass.; on hazelnut, *Corylus americana*, and is attended by *Cremastogaster lineolata*, Say. It is parasited by *Aphycus lecanii*, How., *Cornys fusca*, How., *Microterys*, sp. A new genus, near *Chrysoplatycerus*, and a *Tetrastichus*, sp. (Hyperparasite), were found with one lot. The Coccid was originally described from New York.

- (33) *Lecanium cynosbati*, Fitch; 1856-1898. N. Syn. *Caryæ*, Sign.

From Methuen, Mass.; on three-thorned locust, *Gleditsia triacanthos*. It is attended by *Formica subsericea*, Say. Originally described from New York.

- (34) *Lecanium tessellatum*, Sign; 1873-1898. I.

Found by Mr. J. W. Folsom in the botanic gardens at Cambridge, Mass. (Ckll. in litt.).

- (35) *Lecanium Kingii*, Ckll.; 1898-1898. N.

Quite frequently found on high-bush blueberry, *Vaccinium corymbosum*, L.; at Lawrence, Mass.

- (36) *Lecanium tarsale*, Sign.; 1873, var. 1898. N.

On dogwood, *Cornus alternifolia*, at Lawrence, Methuen, and Andover, Mass. Generally found on the trunk of the trees, seldom on the limbs. It is parasitized by *Blastothrix longipennis*, How.

- (37) *Lecanium Fletcheri*, Ckll.; 1893-1898. N.

At Lawrence, Mass., on *Arbor vitae*. It is found at New York by Mr. Pettit and was described from Ottawa, Canada. Found there by Dr. Fletcher on cedar.

- (38) *Lecanium nigrofasciatum*, Perg.; 1898-1897. N.

Found at Methuen, Boston, Springfield, Holyoke, and Deerfield, Mass., on *Acer rubrum* and *Acer saccharinum*; also found at Washington, D. C.; Maryland, Georgia, Tennessee, Pennsylvania, New Jersey, New York, Delaware, Ohio, Missouri, Illinois, and Florida. It is parasitized by *Aphycus flaviceps*, How. Dr. Howard, who has had all the parasites reared by me for study, reports to me (in litt.) that these specimens were badly shrivelled, so he could not make the determination with absolute certainty, and that the parasite has been previously reared from *Lecanium* by Prof. W. G. Johnson at Champaign, Ill. Dr. Dimmock informs me that some of the trees were very badly infested by this scale, which has been nearly exterminated at Springfield by a parasite. The food plants in other localities are olive, *vaccinium*, plum, apple, peach, birch, maple, Bumelia and *Lindera benzoin*. It also occurs in Western Ontario, Canada, on maple.

- (39) *Lecanium pallidior*, Ckll. and King; 1899-1898. N.

On a young native white cedar, *Chamaecyparis thyoides*, at Methuen, Mass.

- (40) *Lecanium caryæ*, Fitch; 1856-1898. N.

At Lawrence and Methuen, Mass.; on pignut hickory and wild red cherry. The writer has endeavored to find the original type of Fitch's species. At present it looks as though there are none to be found. Prof. Cockerell will in the near future redescribe the species, as it is very much confused with many others, owing to the very short and incomplete description by Fitch. The unrecognized *Lecanium platycerii* described by Dr. Packard in 1869, said to be common in greenhouses in Massachusetts, was probably *Lecanium coffeæ*, Walk.

(41) *Lecanium (Saissetia) anthurii*, Boisduval; 1868, var.

This insect was referred to Mr. Cockerell, who supplies the following remarks:

"Length 2, breadth $1\frac{1}{2}$, height little over $\frac{1}{2}$ mm.; pale reddish-brown to brownish ochreous, broad oval in outline, fairly convex, shiny; with weak ridges forming an H, as in the *oleæ* group; these ridges marked, as in *Beaumontia*, by rows of waxen or glossy patches. Dermal structure as in *coffea*, and exactly as Signoret figures for *anthurii*. Marginal bristles of two sizes, about 24 and 39 μ . Legs a little larger than *coffea*: coxa 150, femur with trochanter 180, tibia 135, tarsus 84, claw 20, claw-digitules 30, tarsal digitules 52 μ . Tarsal digitules filiform, with a small knob. Claw strongly curved, its digitules bulbous at base, and with large round knobs at the end. Antennæ practically as in *coffea*; segments, (1.)39, (2.)42, (3.)54, (4.)42, (5.)39, (6.)30, (7.)24, (8.)36 μ . Formula: 3(24)(15)867. This is evidently very close to *L. coffea*, but the specimens seem to be adult, and in that case they cannot belong to that species. They very nearly agree with *anthurii* as described by Signoret, but are half a mm. shorter, and very much flatter; the tibia also is not twice as long as the tarsus, as it should be in *anthurii*. In many respects the insect is very like *L. Beaumontia*, as described by Douglas, but the description is very inadequate. The present insect was found by Mr. King on grass in a greenhouse, so its native country is uncertain. On the whole, it seems more discreet to leave it as '*anthurii*, var.' than to give a new specific name." (Cockerell, litt., March 23, 1899.) Originally found on Anthurium (Ckll. in litt.).

(42) *Pulvinaria innumerabilis*, Rathv.; 1854-1869. N. Syn. *Acericorticis*, Fitch.

Quite frequently found through the State on maples and perhaps on other food plants, and is preyed upon by *Hyperaspis signatus* and *Chilocorus bivulnerus*; an *Encyrtus* sp., *Aphycus* sp., and *Chiloneurus albicornis*, How., have been reared from it. Recorded from Washington, D. C.; Virginia, New Jersey, New York, Maryland, Pennsylvania, Georgia, Indiana, Illinois, Colorado, Washington, Utah, Oregon, Ohio, Florida, Kansas, Missouri, Michigan, New Mexico, Nebraska, and Western Nevada, on box elder, maple, locust, elm, woodbine, currant, gooseberry, plum, peach, hawthorn, mountain ash, Lombardy poplar, weeping willow, upland willow, swamp willow, flowering currant, osage orange, oak, linden, rose, hackberry, sycamore, spindle tree, beech, and

sumac. There is much doubt about the identity of the species on all of the above food plants. The only way to be sure about these *Pulvinaria* spp. will be to get a large number, say 25 or 50, of each and measure all the antennæ and legs. (Ckll. in litt.)

(43) *Pulvinaria innumerabilis*, var. *tiliæ*; King and Ckll.; 1898-1898.

A variety readily recognized from *innumerabilis* by the colour of the female scale, which is gray with several black spots, giving it a mottled appearance. Found at Methuen and Lawrence, Mass., on *Tilia americana*, white oak, and elm.

(44) *Pulvinaria Macluræ*, Kennicott in Fitch; 1855-1898. N.

What I take to be this species is found on Sumac. It is the largest of the *Pulvinaria* type found here, and not very often found. It has been recorded from New York, New Mexico, and Pennsylvania, on Osage orange.

(45) *Lichtensia viburni*, Sign.; 1873-1898. I.

The species is new to America and was found at Lawrence, Andover, and Methuen, Mass., on leaves of *Spiræa salicifolia*, L., and *Prinos verticillatus*. It is parasitized by *Aphycus Lounsburyi*, How. Dr. Howard, who has so kindly determined all the parasites of my rearing from coccids, also says (in litt.) that he agrees with me that the supposed *Pulvinaria innumerabilis* from different localities and food plants needs further study.

THE MEDITERRANEAN FLOUR MOTH AGAIN.

BY PROF. W. G. JOHNSON, COLLEGE PARK, MD.

Some few weeks ago I had an inquiry referred to me by the Editor of the *American Miller* from a Canadian correspondent, who stated that the flour moth was less than fourteen miles away from his mill, in Wellington (Ontario) district. I contributed a short article regarding this moth in the May number of the *American Miller*, in response to which two other localities have been discovered. One comes from York district, along the Lake, and one from Leeds district, along the St. Lawrence River. It seems clear to me that this insect is spreading along the watercourses of the lakes and inland along the railroads. Four other cases were reported to me, with larvæ and pupæ from each, from the United States side, one coming from Ohio, the first reported from that State, and three from New York. I also have one from Southern California. In every instance the pest has maintained its former reputation as a most dangerous insect.

TAENIOCAMPA RUBRESCENS, WALK.

BY J. ALSTON MOFFAT, LONDON, ONT.

This interesting species has at last been added to the collection of the Entomological Society of Ontario, by the industrious collecting of Mr. J. W. Bice, who took it at electric light in the season of 1898, and was recently identified for me by Dr. J. B. Smith. *Taeniocampa alia*, Guen.—*incerta*, Hubn.—was in remarkable profusion during the early part of that season; and ranging through an extent of variation that was quite confusing. Three good specimens of *rubescens* were taken at the same time, each differing from the other in colour, and were picked out as possibly another variety of *alia*, but when seen by Dr. Smith, he pronounced my Nos. 3, 4, 5 to be *T. rubescens*, and his remark on them was, "A very pretty series, No. 4 being a new form to me."

It seems to be a somewhat rare moth. I find that it was first described and named by Walker in 1865, from a specimen in Dr. Bethune's collection, and from there it has been transferred to the U. S. National Museum, where it is now deposited as the type of the species. As late as 1890, Dr. Smith redescribed it in *Entomologica Americana*, Vol. VI, p. 123, as *T. venata*, from a single specimen taken by Mr. Bruce many years before, and concludes his remarks upon it thus: "I have never seen anything to match this species, and do not think it can be readily confused with any of the described forms." But he afterwards discovered that Mr. Walker had been there before him. Dr. Smith regards it as distinctly a northern species, it never having been taken as far south as New Jersey. In his 1893 Catalogue of the Noctuidæ found in Boreal America, he gives its habitat as "Canada, New Hampshire, northern New York." One would suppose that a northern species would have far less difficulty in spreading southward than a southern one would northward, unless severely restricted in its food plant. Henry Edwards gives the food plants of *T. incerta*, Hubn., as "*Quercus*, *Salix*, *Prunus*." That of *T. rubescens* may be similar, but I have not found any reference to it, and collecting at light is not conducive to the discovery of food plants.

A fine pair of *T. subterminata*, Smith, was added to the collection at the same time, and in the same way.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR
THE SUPERFAMILY SPHEGOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS,
U. S. NATIONAL MUSEUM.

(Paper No. 1.)

In the Journal of the New York Entomological Society for March, 1899, I separated the Hymenoptera into ten superfamilies, viz.: I. Apoidea, II. Sphegoidea, III. Vespoidea, IV. Formicoidea, V. Proctotrypoidea, VI. Cynipoidea, VII. Chalcidoidea, VIII. Ichneumonoidea, IX. Siricoidea, and X. Tenthredinoidea.

In the following pages I now propose to give a classification of the second of these superfamilies, or the Sphegoidea, a large group of wasps at one time confused with the genuine fossorial wasps, but which may be readily separated from them by having the hind angles of the pronotum not extending back to the tegulæ. Of all wasps these are the ones most closely allied to the bees.

Some of the best entomologists of the past — Leach, Dahlbom, Haliday, Westwood, and others — held that the group represented many distinct families; but quite recently some of our modern systematic workers — men of the highest attainments and ability — hold quite different views, treat this vast group as a single family, and would suppress or merge into a single genus many genera that were formerly considered good and distinct.

To use a slang expression, it is the old battle between the “lumpers” and the “splitters” revived, and the evolutionary problems taking place around us are ignored or misunderstood.

I believe firmly both schools, if we may call them such, are honest in their beliefs; but since I belong to the latter, it seems to me as if the students in the former were restrained or misled by affinities, or relationships, often obscure and indefinable, and overlook the fact that evolutionary changes have already been accomplished; and, because they

find certain affinities, would treat all of these important changes that have occurred through ages of evolutionary forces as of no value or significance.

This tendency to lumping I consider a retrogression in our systematic workers, tending to confusion and to unwarrantable changes in our nomenclature; and it is to combat this tendency and make an effort to restore to their proper standing these suppressed families and genera, in accordance with the views held by the older entomologists, that I present herewith, in tabular form, the only possible way of demonstrating thoroughly the value and utility of divisions and genera, my ideas on the classification of this great group of wasps.

Before proceeding with my tables, however, and in order to afford a basis of comparison with my own views, it may be well to call attention to the views of two leading hymenopterists who have given much time and study to this group of wasps, namely, Mr. Wm. J. Fox, of the Philadelphia Academy of Sciences, and Dr. Franz Kohl, of the Royal Hofmuseums of Vienna, Austria.

In 1894, Mr. Fox, following the opinion of some of the recent European authorities, in his paper entitled "A Proposed Classification of the Fossorial Hymenoptera of North America," treats these wasps as representing a single family. He says: "It has been evident for some time that the existing arrangement, that contained in Cresson's Synopsis, is of little value, as it is too superficial. Entirely too many families, without characters to substantiate them, were recognized. The Sphegidae, for instance, were divided into no less than nine families. Accepting these nine families would, it seems to me, necessitate the erection of families for such genera as *Neolarra*, *Bothynostethus*, *Trypoxylon*, and others, which stand more or less isolated and yet possess characters which connect them in one way or another with the formerly existing families, and would form more distinct families were they recognized than, say, the *Mellinidae*, *Ampulicidae*, *Nyssonidae* or *Bembicidae*. How these nine

supposed families have been disposed of the following pages will show."

Mr. Fox then proceeds with his classification of the Fossores *without*, however, giving a table for recognizing these families or even mentioning the salient characters that would distinguish them. He has not even given a single character for distinguishing this so-called family, Sphegidae, but begins by saying: "I would divide this vast family into five subfamilies as follows: Spheginae, Pemphredoninae, Bembicinae, Oxybelinae, and Crabroninae."

Fox then goes on and separates these five subfamilies into tribes: The Spheginae he separates into two tribes, Sphegini and Ampulicini, upon most superficial and totally unreliable characters when the exotic forms are considered; the Pemphredoninae into two tribes, Psenini and Pemphredonini; the Bembicinae, a most conglomerate mixture, into thirteen tribes, Philanthini, Mellinini, Nyssonini, Stizini, Bembicini, Neolarrini, Bothynostethini, Astatini, Diploplectrini, Miscophini, Larrini, and Trypoxylonini; while the Crabroninae and Oxybelinae are without tribes.

The Oxybelinae were first separated from the Crabronidae in 1874 by the Swedish entomologist, C. G. Thompson. I believe they represent a distinct family and have so treated them in my work.

In 1896, Dr. Franz Kohl, who had, however, years before published much on these wasps, published his "Die Gattungen der Sphegiden," a most valuable work, in which he treats these wasps as belonging to a single large family, the Sphegidae, which he divides into generic groups, allied groups, subgenera and species groups.

The work is a masterpiece and should be in the hands of all students of these wasps.

Dr. Kohl recognized nine generic groups, arranged in the following sequence:

| GENERIC GROUPS. | SUBGENERIC GROUPS. | ALLIED GROUPS. | SUBGENERA. | SPECIES GROUPS |
|-------------------|---|--|--|----------------|
| I. | | | | |
| Crabro,..... | <ul style="list-style-type: none"> Crabro, s. l. Oxybelus, Latr. | <ul style="list-style-type: none"> Crabro, s. str. Anacrabro, Pack. Belomicrus, Costa. Oxybelus, Costa., s. str. | <ul style="list-style-type: none"> Crabro, Kohl. Rhopalum, Kohl. Brachymerus, Dahlb. Lindenius.. { <ul style="list-style-type: none"> Lindenius, Dahlb. Entomognathus, Dahlb. Encopognathus, Kohl. Belomicrus, Costa., s. str. (Oxybelomorpha, Brauns. | |
| II. | | | | |
| Pison, Jurine.... | <ul style="list-style-type: none"> Pison, Jur., s. l. Pisonopsis, Fox. | <ul style="list-style-type: none"> Pison, Jur., s. l. Aulacophilus, Smith. Trypoxylon, Ltr. | <ul style="list-style-type: none"> Parapison. Pison. | |
| III. | | | | |
| Miscophus, Jur.. | <ul style="list-style-type: none"> Nilela, Latr. Solierella, Spin. Plenocalus, Fox. Miscophus, Jur. | <ul style="list-style-type: none"> Sylaon, Pisc. Solierella spinolæ, Kohl. Solierella chilensis, Kohl. Nitelopsis, Saund. Miscophus Soliotethus, Brauns. Miscophus, Brauns. | <ul style="list-style-type: none"> Miscophus (genuine). Miscophus chrysis, Kohl. Miscophus handlischii, Kohl. | |

| | |
|------------------|--|
| Iyroda, Say. | |
| | <div> <div>Gastroericus, Spin.</div> <div>Homogambrus, Kohl.</div> <div>Parapiagetia, Kohl.</div> <div>Prosopigastra, Costa.</div> <div>Tachysphex, Kohl.</div> <div>Tachytes, Pauz.</div> <div>Ancistromma, Fox.</div> </div> |
| IV. | |
| Larra, Fabr..... | |
| | <div> <div>Laraxena, Sm.</div> <div>Larra, Fabr.</div> <div>Motes, Kohl.</div> <div>Paraliris, Kohl.</div> <div>Notogonia, Costa.</div> <div>Liris, Fabr.</div> <div>Piagetia, Rits.</div> </div> |
| | <div> <div>Laphyragogus, Kohl.....</div> <div>Dinetus, Jur.</div> <div>Palarus, Latr.</div> </div> |
| | <div> <div>Laphyragogus, Kohl.....</div> <div>Leianthrena, Bingham.</div> </div> |
| | <div> <div>Heliorcytes, Sm.</div> <div>Sericophorus, Sm. (Shuck.)</div> <div>Sphodrotes, Kohl.</div> </div> |
| V. | |
| Astata, Kohl.... | |
| | <div> <div>Zoyphium, Kohl.</div> <div>Astata, Latr.....</div> </div> |
| | <div> <div>Isolated.</div> <div>Diploplectron, Fox.</div> </div> |

| GENERIC GROUPS. | SUBGENERIC GROUPS. | ALLIED GROUPS. | SUBGENERA. |
|-----------------|--|---|---|
| | Isolated. | | |
| | <i>Heliocausus</i> , Kohl. | | |
| | <i>Bembex</i> | <i>Bembex</i> , Fab. <i>Microbembex</i> , Patt. <i>Bembidula</i> , Burm. <i>Steniolia</i> , Say. <i>Monedula</i> , Latr. <i>Stizus</i> , Handl. <i>Handlirschia</i> , Kohl. <i>Sphecius</i> , Dahlb. | |
| VI. | <i>Bembex</i> , Fab. | | |
| | <i>Stizus</i> , Latr. | | |
| | <i>Exeirus</i> , Shuck. <i>Kohlia</i> , Handl. (Isol.) <i>Gorytes</i> , Ltr. (Hdl.) (Isol.) <i>Entomosericus</i> , Dahlb. (Isol.) <i>Mellinus</i> , Fab. (Isol.) | | |
| VII. | <i>Alyson</i> , Jurine, s. l. | | <i>Alyson</i> , Jur., s. str. <i>Didineis</i> , Wesm. |
| | <i>Alyson</i> , Jur. | | |
| | <i>Bothynostethus</i> , Kohl, s. l. | <i>Bothynostethus</i> , Kohl. <i>Scapheutes</i> , Handl. | |
| | <i>Nyson</i> , Latr. (Isolated) | | <i>Nyson</i> . <i>Hyponyssus</i> , Cress. <i>Acanthostethus</i> , Sm. <i>Philanthus</i> , Kohl. <i>Anthophilus</i> , Dahlb. |
| VIII. | <i>Philanthus</i> , Kohl., s. l. | <i>Philanthus</i> , Kohl., s. str. <i>Trachypus</i> , Klug. <i>Philoponus</i> , Klug. <i>Aphilanthops</i> , Patt. <i>Cerceris</i> , Latr. <i>Eucerceris</i> , Cress. | <i>Cerceris</i> , Dhlb. (genuine). <i>Nectanebus</i> , Spin. <i>Didesmus</i> , Dahlb. |
| | <i>Philanthus</i> , Fabr. | | |

IX.

Spheg, L.

| | | |
|-------------------------------------|--|--|
| Sceliphron, Ill. (Kby.), s. l. | Sceliphron, Ill., s. str. | { Pelopocus, i. sp. Sceliphron. Chalybion, Dahlb. Podium, Fabr., s. str. Trigonopsis, Perty. Ammophila, Dahlb. |
| Ammophila, Kirby. | Psammophila, Dahlb. Chlorion, Fabr. | { Ammophila, Kohl. Parapsammophila, Tschbg. |

Spheg, L., s. l.

| | |
|---------------------|--|
| { Harpactopus. | { Pseudospheg, Tschbg. Calospheg, Kohl. Paraspheg, Smith. Palmodes, Kohl. Gastrosphaeria, Costa. |
|---------------------|--|

X.

Ampulex, Jur.

| | |
|-----------------------------|---|
| { Ampulex, Jur., s. l. | { Rhinopsis, Westw. Ampulex, Jur. (genuine). |
|-----------------------------|---|

Tirogma, Westw.
Dolichurus, Latr.{ Psen, Ltr. (genuine) = Mesopora
Westm. = Dahlbomia, Wesm.

Psen, Kohl.

{ Psen annulipes, Com.
Mimosa, Wesm.
Aporia, Wesm.

XI.

Pemphredon

| | |
|---------------------------|--|
| Psen, Latr., s. str. | Psen, Ltr. (= Psen, Dahlb.) Pemphredon, Shuck. Ceratophorus, Shuck. Diphlebus, Westm. Passaloecus, Shuck., s. str. Polemistus, Sauss. |
| Pemphredon, Ltr. | { Stigmus, Jur., st. Pauz. Spilomena, Shuck. Ammoplanus, Gir. |

Passaloecus, Shuck., s. l.

Diodontus, Curt. (Isol.)
Harpactophilus, Sm. (Isol.){ Stigmus, Jur., st. Pauz.
Spilomena, Shuck.
Ammoplanus, Gir.

Every one must and will appreciate the immense work performed by Dr. Kohl in this contribution, and I feel sure the thanks of all working hymenopterologists go out to him for it. His tables are excellent, and with these and the fine figures of venation, representing nearly every known genus, no student will have any difficulty in placing in its proper genus any of these wasps he may capture, provided they are described.

I think, however, some will take exception to his peculiar views in regard to the rank and value he has given his generic groups, subgeneric groups, allied groups, subgenera and species groups. Nor do I think they will always agree with him in his arrangement of some of these groups. In some cases, at least, according to my views, he has not been successful in showing the true affinities of the groups, and has brought into juxtaposition groups and genera that are widely separated. For instance, I do not consider his group *Pemphredon* (representing the old family *Pemphredonidæ*) to have any affinity whatever with *Ampulex* (*Ampulicidæ*), next to which he has placed it.

Other similar incongruities might be pointed out, but since my views in regard to the rank, affinities and arrangement of these wasps are incorporated in the following tables, it will not be necessary to call attention to them here; they will become apparent in my table, and may be readily detected on a comparison of my arrangement with his.

My arrangement of the families recognized is as follows:

SUPERFAMILY II.—Sphegoidea.

Table of Families.

Middle tibiæ always with two apical spurs..... 5.

Middle tibiæ with only one apical spur (occasionally absent in some males).

Median cell in hind wings not twice as long as the submedian, the latter often the longer; front wings with two or three submarginal cells; if with one only the head transverse, not quadrate.. 2.

Median cell in hind wings fully twice as long as the submedian; front wings with only one submarginal cell, very rarely with an indistinctly defined areolet.

Head transverse, the temples not very broad; scutellum margined, the postscutellum armed with a spine, thorn or forked process and with squamæ; front wings with the

first discoidal cell obliterated, rarely distinct, most frequently confluent with the second discoidal

cell.....Family XV., Oxybelidæ.

Head large, quadrate or trapezoidal, the temples very broad; scutellum normal, the postscutellum unarmed without squamæ; front wings with the first discoidal cell always distinct, separated from the second... Family XVI., Crabronidæ.

2. Abdomen with a strong constriction between the first and second segments; eyes often emarginate within.....4.

Abdomen without a strong constriction between the first and second segments; eyes most frequently normal, rarely emarginate within.

Abdomen sessile, never petiolate.....3.

Abdomen petiolate or subpetiolate; cubitus in hind wings usually originating before the transverse median nervure, more rarely interstitial or originating slightly beyond it; transverse median nervure not sinuate 2-shaped; ocelli distinct; labrum most frequently hidden, rarely triangularly exerted, never free.....Family XVII., Pemphredonidæ.

3. Labrum large, free, well developed and triangularly elongated, much longer than wide; cubitus in hind wings usually originating beyond the transverse median nervure, the latter sinuate or somewhat 2-shaped; ocelli aborted, represented by cicatrices.....Family XVIII., Bembicidæ.

Labrum small, not free, usually completely hidden by the clypeus; cubitus in hind wings most frequently originating beyond the transverse median nervure, the latter straight, not 2-shaped; mandibles often emarginate on under side; ocelli distinct or at most with the lateral or hind ocelli aborted or wanting, indicated by cicatrices; front wings with a distinct stigma.....Family XIX., Larridæ.

4. Head wider than the thorax, the temples not narrow, rather broad; eyes most frequently normal; rarely deeply emarginate within, although often slightly emarginate within; abdomen most frequently sessile or subsessile, rarely petiolate (*Tachypus*, Klug), not elongate, ovate or oblong-oval, and most frequently with a deep constriction between the segments, or at least always with a constriction between the first and second; front wings with three submarginal cells, the second often petiolate, the second and third each receiving a

recurrent nervure; cubitus in hind wings variable, interstitial or nearly, or originating far beyond the transverse median nervure..... Family XX., Philanthidæ.

Head not wider than the thorax, the temples very narrow or flat; eyes always deeply emarginate within, or reniform; abdomen elongate, clavate, the first segment elongate, petioliform; front wings with two submarginal cells, the second, however, usually more or less indistinct or subobsolete; cubitus in hind wings originating beyond the transverse median nervure..... Family XXI., Trypoxylidæ.

5. Abdomen without a constriction between the first and second segments; intermediate coxæ not contiguous..... 6.

Abdomen with a more or less distinct constriction between the first and second segments, the first segment coarctate; intermediate coxæ contiguous; mesosternal suture wanting..... Family XXII., Mellinidæ.

6. Mesosternum produced into a forked process posteriorly; mesepisternum not separated; mesonotum with distinct parapsidal furrows..... 8.

Mesosternum normal, not produced into a forked process posteriorly; mesepisternum separated; mesonotum without parapsidal furrows, or at most only vaguely defined.

Abdomen distinctly petiolated..... 7.

Abdomen sessile or subsessile.

Labrum not free, entirely covered by the clypeus, or at most with only its apex visible; cubitus in hind wings originating *before* the transverse median nervure, rarely slightly beyond it, the latter most frequently straight, rarely sinuate or somewhat

♂-shaped..... Family XXIII., Nyssonidæ.

Labrum free, well developed, subtriangular or semicircular, wider than long; cubitus in hind wings originating usually before the transverse median nervure, the latter strongly sinuate or somewhat ♂-shaped; ocelli distinct..... Family XXIV., Stizidæ.

7. Clypeus never produced posteriorly between the antennæ, the latter inserted above the base of the clypeus; metathorax most frequently rounded posteriorly, very rarely with acute angles; cubitus in hind

- wings variable, most frequently originating *beyond* the transverse median nervure, more rarely interstitial . . . Family XXV., Sphegidae.
8. Clypeus posteriorly usually carinate or produced between the insertion of the antennæ so that its basal margin is beyond a line drawn from their base; anteriorly it is often rostriform carinate, or at least more or less produced medially; metathorax usually long, abruptly truncate posteriorly with the angles acute or toothed, although sometimes the angles are rounded; pronotum rather long, conically produced Family XXVI., Ampulicidae.

CORRESPONDENCE.

SPILOSOMA CONGRUA, Walk.

SIR,—As I understand the Rev. Mr. Fyles's recent article on *Spilosoma congrua*, it is contended (1) that *S. congrua*, of Walker, is the same as *S. antigone*, Strecker, and (2) that *cunea*, Drury, is also *antigone*, not *textor*, Harris.

To the former proposition I am inclined to assent on the following grounds:

1. Grote, who made the first examination of Walker's specimens, recognized in them a distinct species.

2. Walker knew *cunea*, Drury, and well separated it from his *congrua* in these words (Cat. Brit. Mus., III., 667):

A. Alæ anticæ albæ.

B. Abdomen non maculatum.

a. Alæ sat angustæ *cunea*, Drury.

b. Alæ latæ *congrua*, Walker.

3. Prof. Smith's statement (Ent. Amer., V., 119), that Walker's description of *congrua* does not apply to *antigone* was doubtless due to his not having before him any specimens of Mr. Fyles's variety "f."

We may then return to the old synonymy of the species:

S. congrua, Walk.

antigone, Strk.

The larva has been described in the following places:

1870. Saunders, CAN. ENT., III., 36 (as *H. cunea*).

1886. Hulst. Ent. Amer., II., 15.

1889. Soule & Elliot, Psyche, V., 263.

1895. Packard. Journ. N. Y. Ent. Soc., III., 177.

1897. Dyar, Journ. N. Y. Ent. Soc., V., 131.

1899. Fyles, CAN. ENT., XXXI., 101.

I am familiar with the larva, as I have found it at Keene Valley and Rhinebeck, New York, and Fort Lee, New Jersey. My larvæ had six stages, not five, as given by Mr. Fyles. The widths of head were .35, .5, .8, 1.3 to 1.45, 2 to 2.2, 2.7 to 3 mm. The full-grown larva corresponds with his description, but occasionally a striking variety occurs, in which the incisures dorsally are banded with pale yellow, somewhat in the manner of *Ecpantheria scribonia*.

To Mr. Fyles's second proposition I would positively dissent:

1. Walker knew *cunea* and separated it by a good character from *congrua*.

2. Southern specimens of *cunea* are larger than the dwarfed ones from the north with which Mr. Fyles is familiar, and it is absurd to suppose that after giving an account of the life-history of the webworm, Dr. Riley should have figured only moths coming from a black, ground-feeding larva (*congrua*). Besides, Dr. Riley's moths are still in the National Museum and are structurally Hyphantria, while, previous to my taking charge of the collection, the Museum had but two specimens of *congrua* (Dr. Riley's collection had none), neither of which could have served for the published figures of *cunea*.

3. In markings, *cunea* and *congrua* may be practically alike. The differences reside principally in the structural characters of the number of spurs on the hind tibiæ and the wing shape.

4. Mr. Saunders's description of the larva of *cunea* as black and feeding on the ground, was simply due to a misidentification of the imago.

Therefore the synonymy of this species may be:

H. *cunea*, Dru.

punctatissima, S. & A.

punctata, Fitch.

pallida, Pack.

var. *budea*, Hübn.

textor, Harr.

candida, Walk.

Numerous references to the larva will be found in Bull. 35, U. S. N. M.

HARRISON G. DYAR.

BOOK NOTICES.

A NATURAL HISTORY OF THE BRITISH LEPIDOPTERA.—By J. W. Tutt, F. E. S.; Vol. I. Swan, Sonnenschein & Co., London, 1899.

In this excellent work of 560 pages the first twelve chapters are devoted to the origin of the Lepidoptera; the ovum or egg; the embryology of a lepidopterous larva; parthenogenesis, external and internal structure of a lepidopterous larva; variation of the imagines; protective coloration and defensive structures of lepidopterous larvæ and classification of the Lepidoptera, with a plate on which is given a phylogenetic tree, illustrating the development of the lepidopter from a hypothetical base. Part II. is devoted to the Sphingo-micropterygid stirps, the Mycropterygids, the Nepticulides, the Cochlidides and the Anthrocerides.

This first volume on the British Lepidoptera is a model in its way, and gives promise that when the entire work is completed little will be left to be desired. One would have expected a chapter on the pupal stage following that on the larva, but probably this will appear in a future volume, as well as the anatomical structure of the imago. The subjects in the first part are dealt with very fully, and it would almost appear that every writer of importance had been culled from, yet the work is not entirely a compilation, for the author's own observations and conclusions are everywhere in evidence.

The subjects of the second part are even more exhaustively treated than those in the first, which is very proper in a work of this character. Six pages and a half are devoted to the first insect dealt with, *Micropteryx calthella*, L., under the headings: synonymy, original description, imago, sexual dimorphism, variation, comparison with other species, egg-laying, ovum, habits of larva, larva, cocoon, pupa, food-plant, habitat, time of appearance, localities and distribution. It is rather discouraging to the student of North American micros to see how full and complete a history is given of these insects in England, while our knowledge of the species in this country stands in comparison to what remains to be learned like small and remote oases in the great desert. It is impossible to do justice to a work of this character in the short space that can be allowed, but no worker on the Lepidoptera should be without it.

C. H. FERNALD.

CATALOGUE OF THE LEPIDOPTERA PHALÆNÆ IN THE BRITISH MUSEUM,
Vol. I., Syntomidæ.—By Sir George F. Hampson, Bart., London.
Printed by order of the Trustees, 1898.

This work, on the general plan of the old British Museum catalogues, avoids all the objections that have been urged against that work. The British Museum authorities are especially fortunate in possessing the services of so thorough and accurate a worker as Sir George Hampson. The volumes are really monographs of the families treated, all species that have been described being included, and not only those represented in the British Museum. In this respect the title fails to do the work justice. A set of plates accompanies the volume, but under a separate cover, which is explained on page vii. of the preface. A synoptic table of the genera is given and of the species in each genus, a description of each species with bibliography and the larvæ when known. An introduction of fifteen pages deals with the general characters of the Lepidoptera in all stages. The author recognizes fifty-two families of Lepidoptera, and he has arranged them in the form of genealogical tree. It would take altogether too much space to discuss this tree in full, but it may be said that it presents many good points, as well as others against which objections can be urged. A key to the families follows.

The Syntomidæ of the world are made to comprise one hundred and sixty-eight genera, and eleven hundred and eighty-four species, of which by far the greater portion are from the tropics of South America. The family runs into the Arctiidæ, it being stated (page 20) that no very exact lines can be drawn between them. Under these conditions it is not surprising that certain genera are included, which, in the opinion of the reviewer, are Arctiidæ. A large table showing the phylogeny of the genera is given, necessarily without reference to the larval characters, as only about one and one-half per cent. of the larvæ of this family have ever been described. The table is without explanation, except the short discussion on page 21, which refers indirectly to it. The few North American species of the Syntomidæ are arranged as follows :

477 *Cosmosoma auge*, Linn.

569 *Pseudomya minima*, Grt.

It is gratifying to have this species at last placed correctly.

679 *Syntomeida ipomea*, Harr.

My partial description of the larva of this species is not referred to.

(Boston Soc. Nat. Hist., XXVII., 138.)

680 *Syntomeida epilais*, Walk.

797 *Didasys balæ*, Grt.

The larva is unknown.

923 *Lymire Edwardsi*, Grt.

This is the *Scepsis Edwardsii*, at times so destructive to the rubber banyan tree of Florida; transferred to one of Walker's genera.

928 *Horama texana*, Grt.

The larva is unknown.

1117 *Eucereon confine*, H. S.

Nelphe carolina, Hy. Edw., is made a synonym of this, the larva being unknown.

1148 *Scepsis fulvicollis*, Hübn.

Under this heading *Packardii*, Grt., is recognized as a variety only.

The larva is not referred to, though it has been described by Coquillett. (CAN. ENT., XII., 44.)

1149 *Scepsis Wrightii*, Str.

Coquillett's notes on the pupa (Journ. N. Y. Ent. Soc., VI., 249) were published too late for insertion.

1150 *Propyria Schausi*, Dyar.

This is referred from the United States under a misapprehension, unless the British Museum possesses specimens from our country.

The types are two specimens in the Edwards collection from Jalapa, Mexico, and I do not know of the occurrence of this species further north.

1152 *Lycomorpha Grotei*, Pack.

The larva is unknown.

1153 *Lycomorpha fulgens*, Hy. Edw.

The larva is unknown.

1154 *Lycomorpha pholus*, Dru.

1165 *Ctenucha venosa*, Walk.

Cressonana, Grt., is made a synonym, certainly erroneously, as it is larger, broader winged, the fringe of both wings continuously white outwardly, the wing markings narrower and paler yellow; the palpi are red on the sides except the terminal joint, not on the under side only as in *venosa*. The larva is unknown. Dr. Packard has published notes on a supposed larva of *Cressonana* (Ann. N. Y. Acad. Sci., VIII., 89).

- 1166 *Ctenucha sanguinaria*, Strk.

Wrongly credited to Stretch instead of Strecker. This is much more likely to be a variety of *Cressonana* than the latter to be related to *venosa* at all closely. The larva is unknown.

- 1168 *Ctenucha brunnea*, Str.

The larva is unknown.

- 1169 *Ctenucha multifaria*, Walk.

The larva is unknown.

- 1170 *Ctenucha rubroscapus*, Mén.

The larva is unknown.

- 1171 *Ctenucha virginica*, Charp.

- 1174 *Dahana atripennis*, Grt.

The larva is unknown.

Erruca pertyi is shown to be a Brazilian insect.

The larvæ of the North American species are known in 43 per cent.

Finally, when it is remembered that the genera of the Syntomidæ were heretofore in almost inextricable confusion, the great value of this publication to working entomologists may be appreciated. The undertaking of a series of monographs of the families of the Lepidoptera of the world, by a competent author, is one of the most important aids to entomology that has ever been produced, and it is entirely fitting that these should emanate from the British Museum. HARRISON G. DYAR.

MR. ARTHUR GIBSON, who has been for three years Secretary and is now President of the Toronto branch and a Director of the Entomological Society of Ontario, has recently been appointed assistant to Dr. James Fletcher, Entomologist and Botanist of the Experimental Farms of the Dominion.

It is with much regret that we record the death of EDWARD WINSLOW CROSS, youngest son of Judge and Mrs. David Cross, which took place at his home in Manchester, N. H., on the 23rd of April. He was a young man of great promise, being only in his 24th year, and was studying law with earnest application at the Harvard Law School up to a fortnight before his death. Two years ago he graduated from Amherst College, Mass. He was an ardent entomologist and had formed a remarkably fine collection of Geometridæ. To his parents and family we beg to offer our respectful sympathy.

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No. 7.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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(Paper No. 2.)

FAMILY XV.—Oxybelidæ.

Unquestionably, this group is closely related to the *Crabronidæ*, where most authorities have placed it; but, to me, the quite different shaped head, the absence of the basal abscissa of the cubitus in the front wings, and the remarkable formation of the scutellum and postscutellum, characters not found in any other group, seem to justify one in separating it from the *Crabronidæ* and treating it as a distinct family.

The group was first recognized as a subfamily in 1874, by C. G. Thomson, in his *Skandinaviens Hymenoptera*, Vol. III., p. 256.

The species prey upon small flies (Diptera), which they store up in their burrows made in loose sandy soil.

The known genera are not numerous, and may be recognized with the aid of the following table :

Table of Genera.

Mandibles beneath *not* emarginate, rarely with an indistinct median incision; submedian cell as long or very nearly as long as the median, the transverse median nervure interstitial, or nearly, with the basal nervure, or at most uniting with the median vein not much before its origin 2.

Mandibles distinctly emarginate beneath; submedian cell very much shorter than the median, the transverse median nervure uniting with the median vein much before the origin of the basal nervure.

Pygidium triangular with a distinct pygidial area, the hypopygidium very narrow. (1) *Oxybelomorpha*, Brauns.

2. Marginal cell at apex pointed, or at least not distinctly truncate; mesopleura rounded, not sharply margined anteriorly; lateral ocelli as near or nearer to the front ocellus than to the eye margin; clypeus simple in both sexes. (2) *Belomicrus*, Costa.
- Marginal cell at apex distinctly truncate; mesopleura sharply margined anteriorly; lateral ocelli usually nearer to the eye margin than to the front ocellus.

Mandibles *with* a median tooth within; postscutellar spine acute or bluntly rounded at apex, never emarginate; clypeus in ♀ truncate, in ♂ tridentate. (3) *Oxybelus*, Latreille.

Mandibles *without* a median tooth within; postscutellar spine long, broad and always emarginate at apex; clypeus in ♀ truncate, in ♂ 4- or 5-dentate. (4) *Notoglossa*, Dahlbom.

The North American species will fall in the following genera :

- | | |
|---|--|
| (1) <i>OXYBELOMORPHA</i> , Brauns. | (16) <i>O. Cressonii</i> , Robt. |
| None. | (17) <i>O. heterolepis</i> , Ckll. et B. |
| (2) <i>BELOMICRUS</i> , Costa. | (18) <i>O. dejectus</i> , Ckll. et B. |
| (1) <i>B. Forbesii</i> , Robt. | (19) <i>O. acutus</i> , Bak. |
| (2) <i>B. cladothricis</i> , Ckll. | (20) <i>O. Robertsonii</i> , Bak. |
| (3) <i>B. argenteospilus</i> , Cam. | (21) <i>O. varicoloratus</i> , Bak. |
| (3) <i>OXYBELUS</i> , Latreille. | (22) <i>O. hirsutus</i> , Bak. |
| (1) <i>O. uniglumis</i> , Linn. | (4) <i>NOTOGLOSSA</i> , Dahlbom. |
| (2) <i>O. quadrinotatus</i> , Say. | (1) <i>N. mexicanus</i> , Robb. |
| (3) <i>O. similis</i> , Cress. | (2) <i>N. bugabensis</i> , Cam. |
| (4) <i>O. quadricolor</i> , Ckll. et B. | (3) <i>N. longispina</i> , Cam. |
| (5) <i>O. subulatus</i> , Robt. | (4) <i>N. azteca</i> , Cam. |
| (6) <i>O. cornutus</i> , Robt. | (5) <i>N. sparidens</i> , Ckll. |
| (7) <i>O. subcornutus</i> , Ckll. | (6) <i>N. Cockerellii</i> , Bak. |
| (8) <i>O. punctatus</i> , Baker. | (7) <i>N. trifidus</i> , Ckll. et B.* |
| (9) <i>O. rejectus</i> , Bak. | (8) <i>N. dilutus</i> , Bak. |
| (10) <i>O. striatus</i> , Bak. | (9) <i>N. intermedius</i> , Bak. |
| (11) <i>O. Packardii</i> , Robt. | (10) <i>N. emarginatus</i> , Say. |
| (12) <i>O. sericeus</i> , Robt. | (11) <i>N. coloradensis</i> , Bak. |
| (13) <i>O. laetus</i> , Say. | (12) <i>N. abdominalis</i> , Bak. |
| (14) <i>O. fulvipes</i> , Robb. | (13) <i>N. frontalis</i> , Robb. |
| (15) <i>O. niger</i> , Robb. | |

* This is founded upon a mutilated specimen, having the squama broken so as to appear trifid.

FAMILY XVI.—Crabronidæ.

The much larger head, which is quadrate or trapezoidal, with very broad temples, the normally-shaped scutellums and the venation of the front wings—the first and second discoidal cells always being distinctly separated, never confluent—readily distinguish the family from the Oxybelidæ; while from the Pemphredonidæ, the only other family to which it shows any affinity, it is at once separated by the venation of the front wings and the *much longer median cell in the hind wings*.

In my studies on the genera of this family as well as many of the other families, I am greatly indebted to my friend, Mr. Wm. J. Fox, of the Philadelphia Academy of Sciences, who most generously placed at my disposal such of his types and other material needed.

In this family I have recognized five distinct groups, which I call subfamilies, although they are much closer related than some of the subfamilies in other families. These may be distinguishable by the aid of the following table:

Table of Subfamilies.

- Abdomen beneath *not* flat, either convex or subconvex and laterally rounded, not acute or carinate, the dorsal segments usually normal, rarely distinctly constricted at the sutures; second discoidal cell not much longer than the first, often shorter and not very narrow. 2.
- Abdomen sessile, beneath *very* flat, and laterally acute or carinate, the dorsal segments with a constriction at the sutures and margined at apex; transverse median nervure in front wings uniting with the median vein *far* before the origin of the basal nervure, the second discoidal cell, in consequence, being very long and narrow, much longer than the first discoidal cell; first recurrent nervure joining the first cubital cell at or near the middle; mesopleura sharply margined anteriorly and posteriorly, and the carina of same connected with a carina along the sides of the mesosternum; mandibles at apex edentate acute; maxillary palpi 6-, labial 4-jointed. . . Subfamily I., Anacrabroninæ.
2. Mandibles at apex simple, edentate; maxillary palpi 6-, labial palpi 4-jointed; first recurrent nervure received by the first cubital cell at or near the middle, never very far beyond the middle. Subfamily II., Lindeniinæ.
- Mandibles at apex 2- or 3-dentate, rarely truncate and indistinctly bidentate in a few females; never, however, acute, as in the *Anacrabroninæ* and the *Lindeniinæ*.

- Abdomen petiolate, or the first segment longly petioliform; the first segment always long and *without* a delicate carina laterally, or at least the lateral carinae are not sharply defined, much abbreviated, and never extend to the apex of the segment...4.
- Abdomen always sessile, never petiolate or with the first segment petioliform; the first segment never very long and always with distinct lateral carinae that extend clear to the apex of the segment; maxillary palpi 6-jointed, labial palpi 3- or 4-jointed; antennae in ♀ 12-, in ♂ 12- or 13-jointed..... 3.
3. Mesopleura *with* a distinct ridge, carina or crest before the middle coxae; recurrent nervure in front wings joining the cubitus always *far* beyond the middle of the first cubital cell, at about its apical fourth or fifth; antennae in both sexes 12-jointed, the flagellum in the ♂ not fringed with fine hairs beneath; ocelli, except very rarely, arranged in an obtuse triangle. ∴, the lateral ocelli being about twice as wide from each other as to the front ocellus or nearly; mesonotum and usually also the mesopleura coarsely sculptured; metathorax more or less coarsely sculptured, opaque or subopaque, never smooth, the cordate area on the posterior face wanting or at most indistinctly defined..... Subfamily III., Crabroninae.
4. Mesopleura *without* a ridge, carina or crest before the middle coxae, at most, and rarely, with only a pointed tubercle; recurrent nervure joining the cubitus at or near the middle of the first cubital cell or somewhat beyond the middle, or at the most never beyond its apical third; antennae in ♀ 12-jointed, in ♂ 13-jointed, the flagellum in the latter usually fringed beneath with fine hairs; metathorax as a rule less coarsely sculptured than in the Crabroninae, often smooth, shining, the cordate area on the posterior face distinct or indistinctly defined, never entirely wanting..... Subfamily IV., Thyreopinae.
3. Mandibles bidentate, rarely 3-dentate or bluntly truncate in ♀; maxillary palpi most frequently 5-jointed, rarely 6-jointed, the labial palpi 3- or 4-jointed; first recurrent nervure in front wings received by the first cubital cell at or near the middle, rarely much beyond the middle..... Subfamily V., Rhopalinae.

SUBFAMILY I.—Anacrabroninae.

The characters made use of in my table of families easily separate this subfamily from the others, the formation of the mesopleura and

abdomen and the long narrow second discoidal cell being quite characteristic and totally different from the other groups.

The group is quite isolated and apparently peculiar to North America.

Only a single genus is known, and with the characters already given, may be distinguished as follows:

Marginal cell in front wings a little longer than the first cubital cell, broadly truncate at apex; head transverse, the temples broad, but not quite as wide as the eyes, the hind orbits bounded by a distinct long carina posteriorly. *Anacrabro*, Packard.

[Type *A. ocellatus*, Pack.]

North American Species.

(1) *ANACRABRO*, Packard.

(1) *A. ocellatus*, Pack.

(2) *A. boerhaviae*, Ckll.

SUBFAMILY II.—*Lindeniinae*.

This subfamily agrees with the *Anacrabroninae* in its mandibular characteristics, but otherwise shows little affinity, the other characters being similar to those in the three subfamilies which follow. From these, however, it is readily separated by the mandibles being acute or rounded at apex and always edentate. In venation it agrees more nearly with *Rhopalinae*, the first recurrent nervure, as in that group, being received by the first cubital cell at or near the middle, but the abdomen is sessile and not petiolate or clavate.

Only three genera are known, distinguished by the aid of the following table:

Table of Genera.

Mandibles not emarginate beneath; antennal foveæ not wider from each other than to the eyes 2.

Mandibles emarginate beneath; antennal foveæ wider from each other than to the eyes.

Eyes hairy; mandibles with two teeth or tubercles within towards base; scutellum with the basal furrow bifoveolated; recurrent nervure uniting with the cubitus distinctly beyond the middle of the first cubital cell; transverse cubitus joining the marginal cell beyond the middle; anal lobe in hind wings extending beyond the short submedian cell; mesosternum without a ridge before the middle coxæ. *Entomognathus*, Dahlb.

[Type *E. brevis*, Lind.]

Eyes bare; mandibles not bituberculate within; scutellum not bifoveolate at base; recurrent nervure received by the first cubital cell beyond its middle; anal lobe in hind wing not extending beyond the submedian cell; mesosternum with a strong ridge before the middle coxæ. . . . *Encopognathus*, Kohl.

[Type *E. Braueri*, Kohl.]

2. Recurrent nervure received by the first cubital cell at or near its middle; transverse cubitus joining the marginal cell a little before its middle; anal lobe in hind wings extending beyond the short submedian cell. *Lindenius*, Lepeletier et Br.

[Type *L. argentatus*, Lep. et Br.]

North American Species.

- (2) *ENTOMOGNATHUS*, Dahlb.

(1) *E. texanus*, Cr.

- (3) *ENCOPOGNATHUS*, Kohl.

None.

- (4) *LINDENIUS*, Lepel. et Br.

(1) *L. errans*, Fox.

(2) *L. latifrons*, Fox.

(3) *L. armaticeps*, Fox.

(4) *L. flaviclypeus*, Fox.

(5) *L. pinguis*, Fox.

(6) *L. salicis*, Ckll. (*Ammoplanus*).

SUBFAMILY III.—*Crabroninæ*.

This group is probably the most extensive one in the family, the species, as a rule, being larger and more gaily coloured than those of the other groups.

The subfamily is readily separated from the others by the very distinct ridge, crest or carina on the mesopleura just before the middle coxæ, a character first pointed out, I think, by Dr. Kohl, and by the first recurrent nervure entering the first cubital cell near its apex, or at its apical fourth or fifth.

Table of Genera.

Males: mandibles at apex always bidentate 10.

Females:

Mandibles at apex bidentate, rarely truncate and indistinctly bidentate; pygidium in ♀ triangular, above flat, never deeply exca-

- vated and without a well-defined pygidial area, the lateral carinae being never highly elevated; ocelli in an obtuse triangle 8.
- Mandibles at apex tridentate; pygidium narrowed towards apex, subogival, and deeply channelled or excavated, with a well-defined narrowed pygidial area, the lateral carinae high; if triangular, which is rare, excavated.
- Mandibles *without* a tooth within towards base 7.
- Mandibles *with* a distinct tooth or blunt process within towards base 2.
2. Superorbital foveae wanting or indicated only by a slight glabrous streak or depression near the upper border of the eyes. 4.
- Superorbital foveae sharply defined, long, linear or oblong.
- Abdomen not strongly punctate, except sometimes the first segment; smooth, polished, impunctate or coriaceous, or finely, sparsely, minutely or microscopically punctate; the dorsal segments, except sometimes the first, not constricted at the sutures, nor delicately margined at apex. 3.
- Abdomen distinctly and more or less strongly punctate, the dorsal segments more or less constricted at sutures and usually delicately margined at apex, or at least some of the basal segments are margined.
- Thorax rather coarsely strongly punctate, the punctures more or less confluent, and sometimes with striæ or fine aciculations on the mesonotum posteriorly, the scutellum and the meso- and metapleura; metanotum reticulated or with sharply defined striæ; clypeus with a median ridge or carinae and quadrately produced medially, the apex of same being truncate or submarginate; head large, quadrate, rather coarsely confluent punctate. Solenius, Lepel. et Br.
- [Type *S. interruptus*, L. et Br.]
3. Head and thorax coarsely sculptured or coarsely rugoso-punctate, the mesonotum posteriorly, the scutellum and the mesopleura superiorly somewhat striate; metapleura opaque, longitudinally aciculated; abdomen with the first segment rather strongly punctate, the following smooth, at the most sparsely punctate; clypeus with a strong median ridge, which is strongly narrowly (not broadly as in *Solenius*) produced beyond the anterior margin, while on each side of it, or between the production and the eyes, is a

Third antennal joint about as long as joints 4-5 united, or nearly thrice as long as the pedicel or second joint; abdomen shining, but minutely or microscopically punctate, the punctures of first segment a little larger. *Pseudocrabro*, Ashm., n. g.

[Type C. *chrysarginus*, Lepel.]

Third antennal joint much shorter than joints 4-5 united.

Abdomen, or at least the basal segment, highly polished, impunctate, or at most sparsely microscopically punctate; pygidial area much narrowed, deeply excavate and fully twice as long as wide at base; first joint of flagellum twice as long as the pedicel *Xestocrabro*, Ashm., n. g.

[Type C. *6-maculatus*, Say.]

Abdomen distinctly, minutely (somewhat sparsely) punctate; pygidial area more nearly triangular, and not twice as long as wide at base; first joint of flagellum only a little longer than the pedicel. *Xylocrabro*, Ashm., n. g.

[Type C. *stirpicola*, Pack.]

7. Ocelli in an obtuse triangle . . . , the lateral ocelli being about twice as wide from each other as to the front ocellus, or nearly; third antennal joint not especially long; thorax sculptured as in *Solenius*; abdomen smooth, impunctate or at most feebly microscopically punctate *Metacrabro*, Ashm., n. g.

[Type C. *Kollari*, Dahlb.]

Ocelli in an equilateral triangle . . . or nearly, the lateral ocelli being not or very little farther from each other than to the front ocellus; superorbital foveæ wanting, never sharply defined, at most represented by a slight glabrous streak near the eye margin; thorax finely closely punctate, opaque, the meso- and metapleura striated; abdomen smooth, impunctate or at most microscopically coriaceous sculptured; third antennal joint elongate, as long or longer than joints 4-5 united. *Clytochrysus*, Morawitz.

[Type C. *sexcinctus*, H. Schf.]

8. Mandibles with a tooth within near the middle or towards the base. Superorbital foveæ very distinct, sharply defined, elongate or linear, dull at bottom. 9.
Superorbital foveæ wanting or at most indicated only by a slight, scarcely perceptible glabrous depression or streak; third antennal joint long, about as long as joints 4-5 united or a little longer;

clypeus with a median ridge or carina; thorax rather coarsely closely punctate, the mesopleura striate and punctate; metathorax at sides, as well as its posterior face, striate or aciculate, sometimes very coarsely, the metanotal area with oblique striæ; abdomen finely but distinctly, minutely punctate. . . Protothyreopus, Ashm., n. g.

[Type *C. rufifemur*, Pack.]

9. Clypeus medially strongly quadrately produced, with a tooth on each side between the median production and the eyes; thorax rather coarsely punctured or sculptured, shining or at most subopaque; metanotum coarsely reticulate, subopaque, the metapleura and posterior face densely striate; abdomen shining, the basal segment very distinctly punctate, the following segments less densely, more minutely or microscopically punctate; mandibles truncate, indistinctly bidentate at apex; anterior tarsi with fine short bristles beneath, the first joint slender, much longer than 2-5 united; face except scrobes and the clypeus clothed with a silvery pubescence. Ceratocolus, Lepel. et Br.

[Type *C. alatus*, Panz.]

10. Mandibles *with* a tooth within towards base; ocelli, unless otherwise mentioned, arranged in an obtuse triangle . . . , the lateral ocelli being very much farther from each other than to the front ocellus 11.

Mandibles *without* a tooth within towards base; ocelli arranged in a triangle . . . ; superorbital foveæ wanting; clypeus produced medially; first flagellar joint elongate, beneath excised so as to appear bidentate Clytochrysus, Morawitz.

[Type *sexcinctus*, H. Schf.]

11. Superorbital foveæ wanting or at most not sharply defined, indicated only by a slight glabrous depression or streak in the sculpture close to the eye margin 14.

Superorbital foveæ always distinct, sharply defined, elongate or linear 12.

12. Front femora unarmed beneath *at base* 13.

Front femora armed with a tooth, angulation or sharp ridge beneath *at base*.

Front tarsi simple, not dilated; middle tibial spur rarely distinct; flagellar joints simple, *not* emarginate beneath; thorax coarsely confluent punctate; abdomen strongly or distinctly

punctate, the dorsal segments somewhat constricted at the sutures and usually delicately margined at apex; head quadrate, coarsely punctate. Solenius, Lep. et Br.

[Type *S. interruptus*, Lep.]

Front tarsi broadly dilated, the tibiae also dilated and clothed with dense white hairs behind; middle femora compressed into a lamina beneath at base; abdomen distinctly punctate; head seen from above obtrapezoidal, from in front much longer than wide Ceratocolus, Lep. (pars.).

13. Front tarsi depressed or dilated, the basal joint being depressed or broad and often with a broad lamina or shield-like expansion; middle tibiae without an apical spur.

Head normal, almost quadrate; front tarsi depressed but not very broad; middle legs normal; antennae with the flagellar joints short, 3-12 with white obtusely rounded, blister-like elevations beneath; abdomen distinctly punctate Hypothyreus, Ashm., n. g.

[Type *C. subterraneus*, Fabr.]

Head usually much narrowed behind, seen from in front much longer than wide, seen from above obtrapezoidal, the temples very broad but converging behind; front tarsi broadly dilated, the basal joint with a broad lamina or shield-like expansion and longer than the following joints united.

Anterior femora and tibiae clothed with a white pubescence beneath, often forming a long flocculus.

Front tarsal joints emarginate at apex; antennae with joints 3-5 almost equal, the joints of the flagellum with blister-like elevations beneath. Thyreus, Lepel.

[Type *C. clypeatus*, Sch.]

Front tarsal joints not emarginate at apex; antennae normal, joints 4-5 equal or nearly, the third longer Ceratocolus, Lepel.

[Type *C. alatus*, Panz.]

14. Antennae with the joints of the flagellum unusually dilated or broadened 17.

Antennae with the joints of the flagellum slender, not broadened.

Scrobes bounded by a transverse carina superiorly; front tarsi with the basal joint depressed and broadened its entire

length; front femora dilated at extreme base beneath or with a slight tooth; middle tibiæ with a short apical spur..... Ectemnius, Dahlbom.

[Type E. guttatus, Dahlb.]

Scrobes normal, not bounded by a transverse carina superiorly.

Front femora normal, *without* a tooth beneath 15.

Front femora *with* a tooth beneath *beyond* the base or near the middle; front coxæ acute or with a tooth beneath; front tarsi depressed or subdilated; head obtrapezoidal, the temples broad and strongly convergent behind; antennæ with the third joint very long, the fourth slightly emarginate at base beneath; pygidium with a median sulcus Crabro, Fabr.

Front femora *with* a tooth or dilate angulation *at base* beneath; front coxæ normal; front tarsi depressed but not very broad, nearly normal; head obtrapezoidal, but the temples not so broad or so convergent as in *Crabro*; antennæ with joints 3-6 emarginate beneath, the sixth very strongly emarginate, the third usually elongate, nearly as long as 4-5 united; mesopleura and metathorax coarsely striate; middle tibial spur present but very short..... Pseudocrabro, Ashm., n. g.

[Type C. chrysarginus.]

15. Front trochanters armed with a spine or tooth beneath, the same often clothed with hairs; metathorax alveolate.

Front tarsi normal, cylindrical; middle tibiæ with an apical spur; antennæ simple, none of the joints emarginate Hypocrabro, Ashm., n. g.

[Type C. 10-maculatus, Say.]

Front trochanters normal, unarmed; metathorax not alveolate.

Front tarsi abnormal, dilated, or at least flattened..... 16.

Front tarsi normal, not dilated.

Middle tibiæ without an apical spur; thorax sculptured as in *Solenius*; abdomen smooth, impunctate or at most sparsely, minutely or microscopically punctate.

Antennæ normal with the second joint much thickened, none of the flagellar joints emarginate beneath..... Metacrabro, Ashm., n. g.

[Type C. Kollari, Dahlb.]

Antennæ with the second joint normal, some of the flagellar joints emarginate beneath.....Xestocrabro, Ashm., n. g.

[Type C. 6-maculatus, Say.]

Middle tibiæ with an apical spur; antennæ with the sixth joint strongly emarginate beneath; abdomen sparsely but distinctly punctate.....Xylocrabro, Ashm., n. g.

[Type C. stirpicola, Pack.]

16. Antennal joints 3 and 6 emarginate, the third about as long as 4-5 united; middle tibial spur distinct; abdomen finely, minutely, but distinctly punctate.....Protothyreopus, Ashm., n. g.

[Type C. rufifemur, Pack.]

17. Abdomen distinctly punctate, the pygidium without a median sulcus.....Thyreocerus, Costa.

[Type C. crassicornis, Costa.]

North American Species.

SUBFAMILY III.—Crabroninæ.

- | | |
|--------------------------------|-------------------------------|
| (5) SOLENIUS, Lepeletier. | <i>quadrangularis</i> , Pk. |
| (1) S. cinctellus, Fox, ♀. | <i>18-maculatus</i> , Pk. |
| (2) S. interruptus, Lepel., ♀. | (2) C. trapezoideus, Pack. |
| (3) S. bellus, Cr., ♀ ♂. | uncertain position. |
| (4) S. producticollis, Pack. | C. saxatilis, Cam. |
| (5) S. rufipes, Lep. | C. Championi, Cam. |
| = excavatus, Fox. | C. antiplanæ, Cam. |
| (6) S. scaber, Lepel. | C. sonorensis, Cam. |
| (7) S. texanus, Cr. | C. montivagus, Cam. |
| ? S. ventralis, Cam. | C. centralis, Cam. |
| (6) THYREUS, Lepel. | C. ariel, Cam. |
| (7) ECTEMNIUS, Dahlbom. | C. vestor, Cam. |
| E. montanus, Cr. | C. costariensis, Cam. |
| E. atriceps, Cr. | C. guerrensis, Cam. |
| E. brunneipes, Pack. | C. yucateensis, Cam. |
| E. corrugatus, Pack. | C. montezuma, Cam. |
| E. parvulus, Pack. | (9) HYPOCRABRO, Ashm. |
| E. pauper, Pack. | H. decemmaculatus, Say, ♀ ♂ |
| (8) CRABRO, Fabricius. | H. Packardii, Cr., ♀. |
| (1) C. maculatus, Fabr. | (10) PSEUDOCRABRO, Ashm. |
| <i>singularis</i> , Sm. | (1) P. odyneroides, Cr., ♀ ♂. |

- | | |
|--|---|
| (2) <i>P. imbutus</i> , Fox. | (2) <i>C. gracilissimus</i> , Pack. |
| (3) <i>P. chrysarginus</i> , Lepel. | (3) <i>C. nigrifrons</i> , Cr. |
| (11) <i>NESTOCRABRO</i> , Ashm. | = <i>septentrionalis</i> , Pack. |
| (1) <i>X. sexmaculatus</i> , Say. | (15) <i>PROTOTHYREOPUS</i> , Ashm. |
| (2) <i>X. trifasciatus</i> , Say. | (1) <i>P. dilectus</i> , Cr., ♀ ♂. |
| (3) <i>X. paucimaculatus</i> , Say. | (2) <i>P. bigeminus</i> , Patt., ♀ ♂. |
| (12) <i>XYLOCRABRO</i> , Ashm. | (3) <i>P. rufifemur</i> , Pack., ♀ ♂. |
| (1) <i>X. stirpicola</i> , Pack., ♀ ♂. | (4) <i>P. villosus</i> , Fox, ♀. |
| (13) <i>METACRABRO</i> , Ashm. | (16) <i>CERATOCOLUS</i> , Lepel. et Br. |
| (14) <i>CLYTOCHRYSDUS</i> , Morawitz | (17) <i>HYPOTHYREUS</i> , Ashm. |
| (1) <i>C. obscurus</i> , Smith, ♀ ♂. | (18) <i>THYREOCERUS</i> , Costa. |

BOMBYX CUNEA AND SPILOSOMA CONGRUA.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

The paper in the May number of *THE CANADIAN ENTOMOLOGIST* on the above subject is very interesting, but does not, in my opinion, entirely conclude the subject. Dr. Fyles proves definitely a considerable range of variability in what he calls *congrua*, and what is without any doubt *antigone*, Strecker. It seems to be certain that there are two species having a very similar range of variation—the insect that we call the fall webworm in the larval stage, and the insect bred by Dr. Fyles. Of the variability of *cunea* there is no doubt. I had not been aware, heretofore, that *antigone* had anything like the same range.

In the matter of determining what species Walker had before him a number of factors must be considered, as we have not available for ready examination the actual specimens described. In the first place there were three examples, apparently similar, for no variations are mentioned; but all from Georgia, and there is a very considerable range of variation in size; that is, from 16 to 20 lines, or one-third of an inch in a small species.

It becomes worth while, then, to question the distribution of the two species, *antigone* and *cunea*, and we find that whereas *cunea* is a common insect throughout the Eastern United States from the Gulf up, and extending well into Canada, we have no record of the capture of *antigone* in any Southern State. I am aware that Georgia is given as a locality in my catalogue of Arctiids, but this was without better basis than the Walker record, which was inadvertently left in. In my own collection there are no Southern specimens of *antigone*, and all the specimens in

the National Museum are from points north of New Jersey. The insect is with us decidedly rare, and only isolated specimens occur. I have never in any collection here seen the banded forms which Mr. Fyles describes, and the indications are all that the insect is rather boreal than otherwise, and would hardly be expected to extend south into Georgia, except possibly as a very rare species. It becomes extremely doubtful, therefore, whether, in a general collection such as that made by Mr. Milne, three banded specimens of *antigone*, so different in size, would be represented. On the other hand, *cunea* is common in the South, and the banded form is almost as frequent at some seasons as is the white. In all the specimens of *antigone* seen by me there is very little variation in size, and they are indeed remarkably uniform. I have six examples, ranging from New York to South Dakota, and between the extremes there is no difference of four lines, while the smallest specimen exceeds considerably the sixteen lines mentioned by Mr. Walker.

Of *cunea* I have a large series, part of them bred, part captured, and among them specimens that attain twenty lines in expanse. On the other hand, I have some that are only half that size. Nearly all the Northern specimens run small; the Southern specimens, on the other hand, mostly run large.

It is also worth noting that there is considerable variation in wing form in the specimens of *cunea*, the width varying from 5 to 8 mm. in almost the same wing length. So we have in *cunea* a variable species that is known to extend well into Georgia, whose range of size equals that given by Mr. Walker, which is common, and of which three specimens might easily be picked up in general collecting.

We have, on the other hand, *antigone*, which is generally rare, which, even in the latitude of New Jersey, is taken very infrequently, in single specimens only, and in immaculate or almost immaculate forms, which becomes more common northwardly, and of which we have no records of captures in the South. Four lines, or one-third of an inch, is a considerable range of variation. None of my examples exceed and only one equals the twenty lines given by Walker, and none are less than full 17 lines. It seems to me, aside from the statements made by Mr. Butler, that the probabilities are against Walker having had three specimens of banded *antigone* before him, while it would be an easy matter for him to get that number of specimens of large, banded *cunea*. I cannot, under the circumstances, feel, therefore, that the case is entirely proved, and that we have any real justification for changing the synonymy as it now stands in the lists.

ASPIDIOTUS (TARGIONIA) HELIANTHI, SP. NOV.

BY PERCY J. PARROTT, MANHATTAN, KANSAS.

♀ scale 1.6 to 1.8 mm. in diameter, .5 to .6 mm. in altitude, circular, quite convex, roughish, a light brown with slight tinge of pink; ventral scale thick, white at centre with brown on margin, not easily separated from scale, when detached from host plant leaves but a very slight trace of white; exuviae sublateral, often nearly marginal, orange, covered with whitish secretion.

♀ oval, deep yellow, with dark brown on margin of posterior segment, and yellowish brown about mesal lobes and region of proboscis. When boiled in caustic potash, becomes transparent, with mesal lobes a yellowish brown, and region of proboscis a reddish brown.

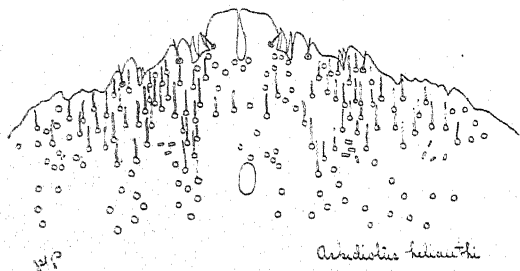


FIG. 30.

There are three pairs of lobes; mesal large, more narrow at base, broadening posteriorly, almost contiguous at apical end and quite widely separated at base, distal end either notched so as to resemble a human molar or almost truncate and broadly rounded on outer margin; second and third pairs of lobes small, bilobed, and mere tooth-like projections. In some specimens there is a small rudimentary fourth lobe. The margin laterad of third pair of lobes very notched. The first interlobular opening broad, in some specimens equalling in width the base of mesal lobes.

Plates simple and short, projecting very little above margin. There are generally two to each incision; those of first incision the largest, the remaining apparently very rudimentary.

Spines small, one on lateral of each lobe. Anal opening quite distant from margin. Tubular glands very numerous, as will be seen in drawing.

This species was found by the writer on March 24th, 1899, on roots of a sunflower, *Helianthus annuus*, near Hackberry Glen, Wabawnee Co., Kansas.

THE NORTH AMERICAN SPECIES OF ORPHULELLA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

By the kindness of Prof. L. Bruner I have recently been able to study specimens of the South American *Orphula pagana* Stal., the type of the genus, and so to compare its structure with that of our native species latterly referred to Orphula. By this it appears, as Mr. Bruner has pointed out to me in correspondence, and as Mr. A. P. Morse has suggested (*Psyche*, VII., 407), that our species should be referred rather to Orphulella, separated by Giglio-Tos from Orphula in 1894, though this was afterwards regarded by him as having only a subgeneric value. Orphula in the stricter sense of the term is not, so far as I know, represented in the United States. Orphulella is the most widely distributed genus of North American Tryxalinæ and the most abundant in species. Those known to Prof. J. McNeill in his recent revision of our Tryxalinæ were well separated by a table which I have here made the basis of a new one to include a considerable number of new forms. Besides describing these, I have added notes of distribution of the others, based on the collections in my hands, and given their principal synonymy.

Table of the North American species of Orphulella.

A¹. Discoidal area of basal half^o of female tegmina generally plainly narrowed distally, where it is nearly always occupied by a single row of cells and is plainly narrower than the ulnar area at its widest part; ulnar area of male occupied by a single row of cells, rarely (tepaneca*) partially divided into two sets by an irregular spurious vein.

b¹. Lateral carinæ of pronotum parallel or very faintly arcuate on the prozona.

c¹. Male antennæ no longer than head and pronotum together, basally depressed and apically acuminate or subacuminate.

d¹. Pronotum less obtusely angulate; prozona and metazona subequal in length; tegmina generally not surpassing the hind femora, the discoidal area in both sexes with a spurious vein running through the middle, dividing it into two sets of cells; ulnar area with a similar (♀) or interrupted (♂) spurious vein, making a similar division. *tepaneca*.

*It is a little difficult to say into which division tepaneca should fall, as it is somewhat variable; by the male it falls best here; by the female under A².

- d*². Pronotum very obtusely angulate; prozona distinctly longer than the metazona; tegmina generally surpassing the hind femora, the discoidal area of both sexes more or less irregularly reticulate, but with no spurious vein; ulnar area with a spurious vein in the female but not in the male.....*compta*.
- c*². Male antennæ a little longer than head and pronotum together, of equal size throughout and nowhere flattened.....*decora*.
- δ*². Lateral carinæ of pronotum distinctly, often greatly, divergent both in front and behind.
- c*¹. Anterior ulnar vein of male tegmina distally much nearer the radial than the lower ulnar vein.
- d*¹. Larger species. Narrowest (middle) portion of pronotal disk more than three-fourths as wide as widest (posterior) portion.....*obliquata*.
- d*². Smaller species. Narrowest (middle) portion of pronotal disk not more, generally less, than three-fourths as wide as the widest (posterior) portion.
- e*¹. More or less variegated, the tegmina usually with a median series of spots; male antennæ no longer than head and pronotum together; hind margin of pronotum obtusely angulate.
- f*¹. Fastigium of vertex less sharply angulate and less prominent, in the male advanced beyond the eyes by not more than a third the length of the eye as seen from above, in the female generally rounded obtusangulate.....*picturata*.
- f*². Fastigium of vertex more sharply angulate and more prominent, in the male advanced beyond the eyes by half or nearly half the length of the eye as seen from above, in the female generally distinctly rectangulate.....*affinis*.
- e*². Rarely variegated, the tegmina usually immaculate; male antennæ longer than head and pronotum together; hind margin of pronotum rounded, scarcely angulate.....*speciosa*.
- c*². Anterior ulnar vein of male tegmina distally equidistant between the radial and lower ulnar veins.....*desereta*.
- A*². Discoidal area of basal half of female tegmina scarcely narrowing distally and here nearly always occupied by more than one row of cells, and little if any narrower than the ulnar area at its widest part; ulnar area of male either divided into two series of cells by a more or less

distinct spurious vein, or irregularly reticulate, never occupied throughout by a single series of cells.

*δ*¹. Lateral carinæ of pronotum arcuate, the disk of unequal width, being narrower, often considerably narrower, in the middle than behind and generally than in front.

*α*¹. Antennæ of male considerable longer than head and pronotum together.

*d*¹. Disk of pronotum only slightly clepsydral, the lateral carinæ diverging but little or not at all in front and not greatly behind; tegmina of male generally but little if at all surpassing the hind femora.....*salina*.

*d*². Disk of pronotum considerably clepsydral, the lateral carinæ diverging noticeably both in front and behind; but especially behind; tegmina of male generally considerably surpassing the hind femora.....*pratorum*.

*α*². Antennæ of male no longer or scarcely longer than head and pronotum together.

*d*¹. Fastigium of vertex generally rectangulate in front; disk of pronotum distinctly clepsydral, the lateral carinæ distinctly and often considerably divergent both in front and behind; ulnar area of tegmina, even in the male, but little wider than the discoidal area.....*pelidna*.

*d*². Fastigium of vertex usually acutangulate in front; disk of pronotum feebly clepsydral, the lateral carinæ scarcely or not diverging in front and not greatly behind; ulnar area of tegmina, especially in the male, distinctly wider than the discoidal area.....*olivacea*.

*δ*². Lateral carinæ of pronotum subparallel, so that the disk is of subequal width throughout.

*α*¹. Antennæ of female no longer or scarcely longer than the pronotum, distinctly flattened; face little oblique.....*viridescens*.

*α*². Antennæ of female distinctly longer than the pronotum, cylindrical; face considerably oblique.....*Scudderi*.

Having seen no specimens of *O. orizabæ* McNeill, I am unable to give it a place in the table, but it will fall in the close vicinity of *O. tepaneca*.

ORPHULELLA TEPANECA.

Stenobothrus (Rhammatocerus) tepanecus Sauss., Rev. Mag. Zool., 1861, 319 (1861).

Stenobothrus tepanecus Walk., Cat. Derm. Salt. Brit. Mus., IV., 756 (1870).

Specimens in my collection come from Corpus Christi Bay, Tex., Dec., Palmer; Mexico, Sumichrast, Botteri; Venis Mecas, Mex., Palmer; San Mateo del Mar, Tehuantepec, Sumichrast; Guatemala, Van Patten; and Realejo, Nicaragua, McNeill.

The species described by McNeill under the name *Orphula tepanica*, and doubtfully referred by him to Saussure's species, belongs, I think, to another species which I have here named *Orphulella affinis*.

ORPHULELLA COMPTA, sp. nov.

Green or dead-leaf brown, frequently with a broad dusky occipital stripe on the head, and always with a postocular fuscous stripe, more or less conspicuous, generally rather broad, straight, and cut by the lateral carinæ of the metazona. Head generally more or less flavous on the face, of medium size, the face considerably oblique; fastigium considerably depressed behind the raised margins, which are rectangulate (♀) or a little acutangulate (♂), with rounded apex, advanced in front of the eyes by less than the width between the eyes; frontal costa not very prominent, rather narrow, plane or faintly sulcate and sparsely punctate, percurrent or almost percurrent, and slightly enlarged below; lateral foveolæ faint, linear, brief; eyes moderately large, subovate; antennæ as long as (♂) or slightly shorter than (♀) the head and pronotum together, luteo-testaceous, the post-basal joints depressed but not broadened. Pronotum rather short, obtusely angulate behind, the prozona distinctly longer than the metazona, the lateral carinæ almost parallel on the prozona, considerably divergent on the metazona, luteous and noticeably dividing the postocular fuscous stripe. Tegmina generally slightly surpassing the hind femora, the discoidal area of basal half narrowed distally, more or less irregularly reticulate, but with no spurious vein; ulnar area without (♂) or with (♀) a spurious vein; median area often flecked or more or less clouded with fuscous. Hind femora considerably surpassing the abdomen, moderately slender, green or testaceous.

Length of body, ♂, 16 mm., ♀, 22 mm.; antennæ, ♂ ♀, 6.25 mm.; pronotum, ♂, 3.25 mm., ♀, 4.25 mm.; tegmina, ♂, 14 mm., ♀, 16.25 mm.; hind femora, ♂, 10.5 mm., ♀, 13.5 mm.

26 ♂, 19 ♀. Palm Springs, Cal., July 10-13; Yuma, Ariz., July 5, A. P. Morse.

ORPHULELLA DECORA.

Orphula decora McNeill, Proc. Dav. Acad. Nat. Sc., VI., 239-240, pl. 4, fig. 17d (1897).

I have specimens which I refer to this species taken by Belfrage in Bosque Co., Tex., and by myself at Pueblo, Col. It was originally described from Arkansas.

ORPHULELLA OBLIQUATA, sp. nov.

Green or brown, marked with fuscous. Head moderately large, flavo-testaceous with a greenish tinge, often green or brownish testaceous above, with a broad postocular fuscous or greenish fuscous stripe, deepest in colour above; vertex well arched, the fastigium rectangulate (♂) or obtusangulate (♀) in front, with raised margins, before which the surface is depressed; lateral foveolæ faint, linear; face arcuate, not very strongly retreating; frontal costa percurrent, rather narrow, faintly enlarging from apex to base, plane or in the female sometimes faintly sulcate; eyes moderate; antennæ castaneous, sometimes apically infuscated, scarcely depressed basally, in the female shorter than head and pronotum together. Pronotum of moderate length, the hind margin very obtusangulate, the lateral carinæ usually flavous, and cutting the generally broad fuscous postocular stripe, which lies anteriorly below, posteriorly within them, gently arcuate, the disk narrowest in advance of the middle, but here fully three-fourths as wide as posteriorly. Tegmina extending about as far back as the hind femora, the discoidal area of the basal half narrowing a little distally, and in this distal portion occupied by only a single row of cells, and much narrower than the widest part of the ulnar area, the latter occupied in the male by only a single row of cells, the anterior ulnar vein distally much nearer the radial than the lower ulnar vein; median area in basal two-thirds marked interruptedly with fuscous. Hind femora surpassing the abdomen, slender, compressed, green or brown, the outer face more or less infuscated.

Length of body, ♂, 19 mm., ♀, 21.5 mm.; antennæ, ♀, 5 mm.; pronotum, ♂, 3.6 mm., ♀, 4.1 mm.; tegmina, ♂, 17 mm., ♀, 18.5 mm.; hind femora, ♀, 14 mm.

1 ♂, 6 ♀. Dallas, Tex., Boll.; Fort Collins, Col., Baker.

ORPHULELLA PICTURATA, sp. nov.

Green or brown, marked with fuscous. Head of moderate size, lighter coloured below than above, with or without a generally slender postocular fuscous stripe; vertex gently arched, the fastigium depressed behind the raised margins, which are rectangulate (♂) or feebly obtusangulate (♀) in front, the fastigium not advanced beyond the eyes by more than a third the length of the eyes as seen from above; lateral foveole obsolete; frontal costa percurrent, narrow above, regularly enlarging to twice the width below, sparsely punctate, plane; eyes moderate; antennæ luteo-castaneous, apically infuscated, in both sexes much shorter than head and pronotum together, feebly depressed basally. Pronotum rather short, the hind margin obtusely angulate, the lateral lobes generally much infuscated, and obscurely and rather irregularly pictured, often with a slender fuscous stripe next the lateral carinæ, below them on the prozona, within them on the metazona, the carinæ somewhat arcuate, diverging posteriorly more than anteriorly, and the disk at its narrowest less than three-fourths as wide as posteriorly. Tegmina green or brown, usually with a median series of more or less confluent fuscous maculations, the discoidal area of the basal half of the tegmina narrowing a little distally in the female, and here occupied by one or sometimes partially by two rows of cells, narrower than the widest part of the ulnar area, the latter occupied in the male by a single row of cells, the anterior ulnar vein very much nearer the radial than the lower ulnar vein. Hind femora extending about as far as the tegmina, and, at least in the male, well beyond the abdomen, slender, compressed, green or brownish testaceous, more or less infuscated.

Length of body, ♂, 15.5 mm., ♀, 21 mm.; antennæ, ♂, 4.6 mm., ♀, 5.5 mm.; pronotum, ♂, 3.1 mm., ♀, 3.5 mm.; tegmina, ♂, 11.5 mm., ♀, 16 mm.; hind femora, ♂, 9 mm., ♀, 13.25 mm.

18 ♂, 20 ♀. Dallas, Tex., Boll.; Texas, Belfrage. Mr. A. P. Morse also took this species June 25th, by the railway in Texas, at Rosenberg, Walden, Pierson, Eagle Lake, and Flatonia.

ORPHULELLA AFFINIS, sp. nov.

? *Orphula tepanica* McNeill (nec *tepanica* Sauss.), Proc. Dav. Acad. Nat. Sc., VI., 242-243, pl. 4, fig. 17a (1897).

Brown, rarely green, with the usual markings of the genus, the broad occipital dusky stripe generally darker at the margins, the fuscous postocular stripe cut on the metazona by the luteous lateral carinae. Head of moderate size, the face considerably oblique, the fastigium advanced beyond the eyes in the male by half or nearly half the length of the eyes as seen from above, acutangulate in the male, rectangulate in the female, in both much depressed behind the strongly raised margins; frontal costa narrow, sulcate, enlarging below the ocellus, sparsely punctate; lateral foveolæ obsolete; eyes normal; antennæ slightly (♂) or much (♀) shorter than head and pronotum together, castaneous, apically infuscated, the post-basal joints depressed but not broadened. Pronotum not very long, the hind margin obtusely angulate, the prozona faintly longer than the metazona, the lateral carinae divergent both in front and behind, and the narrowest part of the disk thus limited not more than three-fourths as wide as the posterior portion. Tegmina generally surpassed a little by the hind femora, the median area usually maculate, the discoidal area of the basal half narrowed distally in the female, and occupied by only a single series of cells, the anterior ulnar vein of male distally much nearer the radial than the lower ulnar vein, the ulnar area occupied by a single series of cells. Hind femora considerably surpassing the abdomen, the hind tibiae dull luteous, with a very obscure pallid postgenicular annulus.

Length of body, ♂, 17 mm., ♀, 24 mm.; antennæ, ♂, 5.75 mm., ♀, 5 mm.; pronotum, ♂, 3.5 mm., ♀, 4.5 mm.; tegmina, ♂, 12 mm., ♀, 17 mm.; hind femora, ♂, 10.5 mm., ♀, 13.5 mm.

19 ♂, 23 ♀. San Diego, Cal., July 22; Coronado, Cal., July 24, and Kern City, Cal., Aug. 4, A. P. Morse; Colorado Desert, Cal., Aug. 13, Mus. Stanf. Univ.

ORPHULELLA SPECIOSA.

Stenobothrus speciosus Scudd., Bost. Journ. Nat. Hist., VII., 458 (1862).

Orphula speciosa McNeill, Proc. Dav. Acad. Nat. Sc., VI., 240-242, pl. 4, fig. 17c (1879).

Stenobothrus aequalis Scudd., Bost. Journ. Nat. Hist., VII., 459-460 (1862).

Stenobothrus bilineatus Scudd., Ibid., VII., 460-461 (1862).

Stenobothrus gracilis Scudd., Rep. U. S. Geol. Surv. Nebr., 250 (1871).

I have before me a series of specimens from Halifax, N. S., Piers; Moosehead Lake, Scudder; Norway, Smith; Mt. Desert, Scudder, and Brunswick, Me., Packard; the White Mt. Valleys and Hampton, N. H., Scudder; Brandon, Vt., Scudder; Summit of Graylock, Boston, Cape Cod and Nantucket, Scudder, and Blue Hills, Henshaw, and Wellesley, Mass., Morse; Farmington, Norton, and Thompson, Conn., Morse; Minnesota; Colona, McNeill and Ogle Co., Ill., Allen; Denison, Crawford Co., Dallas Co., and Jefferson, Iowa, Allen; Nebraska, Dodge, and West Point, Bruner, and the Valley of the Platte, Nebr., Hayden; and Bosque Co., Tex., Belfrage.

ORPHULELLA DESERETA, sp. nov.

Pale gray-green, the green prevailing in the female, the gray in the male, both marked with fuscous in the usual manner. Head moderately large and prominent, the face rather pallid and moderately oblique, more so in the male than in the female, marked behind the eyes with a sometimes slender, sometimes broad, postocular fuscous streak, sometimes edged above with luteous; vertex well arched, more or less sometimes very slightly infuscated, the infuscation often concentrated in a pair of longitudinal stripes; fastigium well advanced, depressed before the raised margins, which are rectangulate or slightly acutangulate (δ) or obtusangulate, the apex rounded (φ); frontal costa narrow above, broadening below the ocellus, plane or feebly sulcate near the middle; eyes moderate; antennae a trifle longer (δ) or distinctly shorter (φ) than the head and pronotum together, luteous, apically considerably infuscated, the post-basal joints somewhat depressed. Pronotum of moderate length, broadly rounded obtusangulate behind, the lateral carinae luteous, cutting the generally narrow postocular fuscous stripe, considerably arcuate, diverging more posteriorly than anteriorly, the disk at the narrowest about two-thirds as broad as the widest posterior part, the lateral lobes below the postocular stripe immaculate or clouded above with fuscous. Tegmina somewhat surpassing the abdomen, the median area maculate with fuscous, the discoidal area of the basal half in the female distally narrowed slightly and a trifle wider than the widest part of the ulnar area, occupied partly by a single, partly by a double row of

cells, the ulnar area of the male occupied by a single row of cells, one or two of which are sometimes divided to form part of a second row, the anterior ulnar vein running distally about midway between the radial and the lower ulnar vein. Hind femora extending about as far back as the tegmina, slender, compressed, generally immaculate, but occasionally obscurely bifasciate with fuscous.

Length of body, ♂, 18.5 mm., ♀, 24 mm.; antennæ, ♂, 7 mm., ♀, 6.5 mm.; pronotum, ♂, 3.25 mm., ♀, 4 mm.; tegmina, ♂, 14 mm., ♀, 18 mm.; hind femora, ♂, 10 mm., ♀, 13.5 mm.

19 ♂, 11 ♀. Salt Lake Valley, Utah, Aug. 1-4.

ORPHULELLA SALINA, sp. nov.

Green or brown, marked with fuscous. Head moderately large and prominent, the face paler than the rest and moderately oblique, the postocular fuscous stripe usually present and usually slender; vertex rarely infuscated, moderately convex, the fastigium considerably depressed behind the well elevated margins, which are rectangulate, well advanced, in the male sometimes acutangulate; lateral foveolæ obsolete; frontal costa narrow, faintly broadening below, more or less sulcate, especially in the male; eyes of medium size; antennæ somewhat longer (♂) or slightly shorter (♀) than head and pronotum together, pale testaceous, apically infuscated, slightly depressed in the basal half. Pronotum of moderate length, rounded subtruncate behind, the lateral carinæ luteous, cutting the narrow fuscous postocular stripe, gently arcuate, diverging but little, occasionally not at all in front, and but little behind. Tegmina but little if at all surpassing the hind femora, the median area especially in the female maculate with fuscous, the discoidal area of basal half not narrowed distally in the female, nor narrower than the ulnar area, and filled irregularly with a double row of cells, the ulnar area of the male with a spurious vein dividing it through at least most of its course so as to form a double row of cells. Hind femora reaching (♀) or surpassing (♂ ♀) the abdomen, only moderately slender and compressed, immaculate.

Length of body, ♂, 16 mm., ♀, 23 mm.; antennæ, ♂, 5.75 mm., ♀, 6.5 mm.; pronotum, ♂, 2.75 mm., ♀, 4 mm.; tegmina, ♂, 14 mm., ♀, 18 mm.; hind femora, ♂, 9.5 mm., ♀, 11.75 mm.

7 ♂, 17 ♀. White River, Col., at Utah boundary, July 24 to Aug.

13; Provo, Utah, Aug. 23-24; Salt Lake, Utah, Packard; Spring Lake Villa, Utah Co., Utah, Aug. 1-4, Palmer.

ORPHULELLA PRATORUM, sp. nov.

Green or brown, generally the latter, marked variably with fuscous, but generally with a broad and distinct blackish fuscous postocular stripe on head and pronotum, cut on the latter by the luteous lateral carinae; head occasionally with a pair of vertical fuscous stripes, enclosing a median testaceous stripe, in which case the disk of the pronotum and anal area of the tegmina are also testaceous. Head rather large and prominent, the face not very oblique; fastigium well advanced, considerably depressed behind the well elevated margins, which are rectangular (♂) or obtusangulate (♀) in front; lateral foveolae obscure, sublinear; frontal costa much compressed and narrowed above, gently enlarging below, feebly sulcate; eyes rather large; antennae somewhat longer (♂) or a little shorter (♀) than the head and pronotum together, testaceous, apically a little infuscated, the post-basal joints feebly depressed. Pronotum rather long, subtruncate but obtusangulate behind, the lateral carinae arcuate, diverging considerably both in front and behind, but especially behind. Tegmina, at least in the male, generally considerably surpassing the hind femora, the median area often maculate with fuscous, the discoidal area of basal half of female tegmina not narrowed distally nor narrower than the ulnar area, irregularly reticulate with more than a single row of cells; ulnar area of male with a distinct spurious vein dividing it so as to form a double row of cells. Hind femora surpassing the abdomen, moderately slender, often clouded with fuscous, the hind tibiae often with a pallid postgenicular annulus.

Length of body, ♂ , 21 mm., ♀ , 24 mm.; antennae, ♂ , 7.5 mm., ♀ , 7.4 mm.; pronotum, ♂ , 4 mm., ♀ , 4.5 mm.; tegmina, ♂ , 18 mm., ♀ , 20 mm.; hind femora, ♂ , 12 mm., ♀ , 14.5 mm.

43 ♂ , 48 ♀ . Maryland, Uhler; Carolina, Schaum; North Carolina, Uhler; Smithville, N. C., Nov. 22, Maynard; South Carolina; Georgia, Morrison; Lakin, Kans., Sept. 1, Scudder; Canon City, Col.; Texas, Belfrage; Bosque Co., Tex., Oct. 15, Belfrage; Dallas, Tex., Boll.; Gulf Coast of Texas, Aaron.

Specimens from the Eastern United States are generally smaller than those from the West.

ORPHULELLA PELIDNA.

Gomphocerus pelidnus Burm. !, Handb. Ent., II., 650 (1838).

Stenobothrus pelidnus Thom., Rep. U. S. Geol. Surv. Terr., V., 95 (1873).

Orphula pelidna McNeill, Proc. Dav. Acad. Nat. Sc., VI., 235-239 (1897).

Stenobothrus maculipennis Scudd. !, Bost. Journ. Nat. Hist., VII., 458-459 (1862).

Stenobothrus propinquans Scudd. !, Ibid., VII., 461 (1862).

Specimens before me come from Boston, Blue Hills, Provincetown, Cape Cod and Nantucket, Mass.; Stamford, Conn., Morse; Staten Island, Davis, and Long Island; Minnesota; Fort Collins, Col., Baker; Capron and Fort Reed, Comstock, Appalachicola, Thaxter, Sanford, Frazer, Charlotte Harbor and Biscayne Bay, Mrs. Slosson, and Key West, Fla., Morrison, Palmer; La Firmina, Cuba, Wright; and the Isle of Pines, Scudder; Atmore, Ala., Morse; Mesilla, N. Mex., June 29, Morse; and Colton, July 17, Los Angeles, July 26, and Gazelle, Cal., Sept. 4, Morse.

ORPHULELLA OLIVACEA.

Stenobothrus olivaceus Morse. !, Psyche, VI., 477-478, figs. 1, 2 (1893).

Orphula olivacea Morse, Ibid., VII., 327, 411, pl. 7, figs. 10, 10a (1896); McNeill, Proc. Dav. Acad. Nat. Sc., VI., 239, pl. 4, fig. 17b (1897).

Orphula (Orphulella) olivacea Gigl.-Tos., Boll. Mus. Zool. Tor., XII., No. 301, 2 (1897).

Mr. Morse has given me specimens taken by him at Stamford and Norwich, Conn., and I have others from Maryland, Uhler, and Georgia, Morrison, besides a number taken by C. M. Weed on Bermuda. Giglio-Tos reports it from Panama and Venezuela.

ORPHULELLA VIRIDESCENS, sp. nov.

Green throughout, the head more or less flavescent, the disk of the metazona somewhat feebly infuscated, and the upper part of the lateral lobes bordering the carinae with a slender purplish fuscous stripe extending to the eye. Head moderately large, the face only a little oblique; fastigium a little depressed within the rectangulate margin; frontal costa moderately prominent, plane and delicately punctate, narrowed above,

very gradually enlarging to the ocellus, below which it is subobsolete; lateral foveolæ wanting; eyes moderate, subpyriform; antennæ about as long as the pronotum, with the post-basal joints distinctly depressed. Pronotum rather short, feebly rounded in front, slightly rotundato-angulate behind, the lateral carinæ subparallel, faintly sinuate, the disk narrowest behind the middle of the prozona, which is barely longer than the metazona. Tegmina barely surpassing the hind femora, the discoidal area scarcely narrowing distally and scarcely narrower than the widest part of the ulnar area, rather densely reticulate proximally, with two rows of irregular cells distally; wings with the veins of the anterior area more or less roseate. Hind femora as long as the abdomen, not very slender, green, feebly ferruginous beneath.

Length of body, 20 mm.; pronotum, 4 mm.; tegmina, 15.5 mm.; hind femora, 13 mm.

1 ♀. Mt. Alvarez, Mexico, E. Palmer.

ORPHULELLA SCUDDERI.

Ophula Scudderi Bol., Mém. Soc. Zool. France, I., 142 (1888).

I have specimens taken at La Firmina, near Bemba, Cuba, by Wright, and on the Isle of Pines by myself.

ERRATUM.

Page 121 (C. E., May, 1899), near the bottom, for "*Eudeopsylla*" and "*Eudeopsylla nigra*," read "*Udeopsylla*" and "*Udeopsylla nigra*."

SOME NEW SPECIES OF DELTOCEPHALUS.

BY E. D. BALL, FORT COLLINS, COLO.

DELTOCEPHALUS AREOLATUS, n. sp.

Resembling *imputans*, Osb. & Ball, but with a much longer vertex; vertex longer than in *producta*, Walk. Olive green, a spot on the middle and another at the tip of each elytron and all below black. Length, ♀, 4 mm.; ♂, 3.5 mm.; width, 1.75 mm.

Vertex flat, strongly acutely angled, the tip rounding, almost twice as long as the pronotum, fully twice longer than width between eyes, margin sharp, angle with the face acute; front depressed, almost as much above the ocelli as below, lateral margins straight, continuous with those of the clypeus; loræ small, two-thirds the width of the clypeus; pronotum

over twice wider than long — half the length within the anterior curve; elytra flaring, venation of the reflex-veined type, the second cross nervure wanting.

Colour: vertex yellowish olive, the tip ivory white, margined with black, pronotum olive, the anterior third yellowish, elytra pale olive, a large fuscous blotch back of the cross nervure between the sectors, and another on the margin of the third apical cell, reflexed veinlets white, margined anteriorly with fuscous, all below, except tarsi and part of the genitalia, black.

Genitalia: female, ultimate ventral segment twice the length of the penultimate, lateral margins strongly narrowing posteriorly, posterior margin angularly excavated one-third the depth of the segment, with a rounding medially cleft tooth equalling the lateral angles; male, valve triangular, the apex produced, plates narrow at base, nearly twice longer than valve, narrowing towards the blunt, angularly divergent apices.

Described from one female from Arizona (Kunze), one from College Park, Md. (Johnson), and one male from Md. (Heideman). This is another of the reflex-veined group, and would fall between *producta* and *imputans*; from the former it is readily separated by its colour, and from the latter by the much longer vertex.

DELTOCEPHALUS FLEXULOSUS, n. sp.

Form of *reflexus* nearly with narrower vertex and elytra, resembling *abbreviatus* in colour and ornamentation. Light cinereous, with the margins of the nervures and the markings on the vertex fuscous; face black above, white below. Length, ♀ 4 mm., ♂ 3.5 mm., width 1.25 mm.

Vertex one-third longer than pronotum, nearly that much longer than its basal width, disc flat, the margins sharp; face as in *reflexus*; pronotum distinctly narrower than the eyes, twice wider than long; elytra longer, narrower than in *inflatus*, with a similar venation, veins on clavus separate or only connected by a cross nervure.

Colour: light cinereous washed with pale yellow, traces of pale olive or fuscous lines on the pronotum; margins and tip of vertex ivory white, an orange line just inside the margin and a fuscous circle around tip; elytra pale, the nervures creamy white with narrow fuscous margins, a fuscous spot either side the cross nervure on the clavus, and a larger pair next the first cross nervure on the corium, the apical margin and the anterior margins of the reflexed veinlets fuscous; upper half of face shin-

ing black, with traces of four light arcs, lower half light lemon-yellow.

Genitalia: female, ultimate ventral segment resembling *abbreviatus*, twice longer than penultimate, lateral margins narrowing posteriorly, posterior margin angularly emarginate, a broad wedge-shaped median tooth extending beyond the lateral angles, the apex slightly notched in the middle and arcuated either side; male, valve broad, triangular, plates narrow convex, half longer than valve; pygofer longer than plates, compressed ventrally, forming a blade-like structure, for the reception of which the plates are notched half way to the base.

Described from numerous specimens taken at Fort Collins, Colo., and back into the mountains to the Little Beaver (9,500 feet), also specimens from Windsor, Estes Park, Denver and Holly in Colo., and from Western Kansas. The black on the upper half of the face will serve to separate it from all but *reflexus* and the following species, and from these it may be distinguished by the flat pygofer and the notched plates.

DELTOCEPHALUS STYLATUS, n. sp.

Similar in form and colour to *flexulosus*, but broader, as broad as *inflatus*, with the black on the face and the flaring elytra of *reflexus*. Length 4.5 mm., width 1.75 mm.

Vertex one-third longer than pronotum, little longer than its basal width; width across eyes equal to the combined length of pronotum and vertex; front and clypeus proportionally broader than in *flexulosus*; elytra longer than abdomen in most specimens; venation as in *inflatus*, the basal angle of the third apical cell a right angle, claval nervures separate.

Colour: pale cinereous, vertex greenish, markings on margin and tip as in *flexulosus*, a transverse band on either side before eye and a spot in the middle of either side at the base fuscous; pronotum with a sub-marginal row of fuscous spots; elytra pale, with dark margined nervures and fuscous markings as in *flexulosus*.

Genitalia: female, ultimate ventral segment over two and one-half times as long as penultimate, lateral margins nearly parallel, posterior margin straight, produced on the middle third into an obtusely triangular tooth, which is bifid at the apex and bears a small lateral tooth at about the middle of either side; male, valve equilaterally triangular, plates narrow, extending beyond the valve scarcely its length, roundly divergent at the apex, where they are half as wide as at the base, their tips roundly emarginate, pygofer inflated, extending considerably

beyond the plates, their inner margins extending into a pair of narrow, curved, black, style-like processes.

Described from five males and five females swept from prairie grass at Little Rock, Iowa, by the author.

DELTOCEPHALUS MISSELLUS, n. sp.

Form and general appearance of *Sayi*, but smaller and lighter coloured, resembling the European *picturatus* and *flori*, but readily separated by the genitalia. Length 2.75-3 mm., width 1 mm.

Vertex flat, right angled before, its length and basal width equal, one-third longer on middle than against eye, slightly longer than pronotum; face as in *Sayi*, the front narrow, wedge-shaped, the lateral margins continuous with those of the clypeus; pronotum over twice wider than long; elytra broad and short, broadly rounding behind, the apical cells little longer than their apical width; elytra shorter than the abdomen in the female, longer in the male.

Colour: pale cinereous washed with yellowish brown, the anterior half of the vertex, except the lateral margin, brownish fuscous, divided into four quadrants by a light cross, the anterior pair darkest on the oblique margins; pronotum irregularly marked with fuscous; elytra pale cinereous, the nervures whitish, irregularly margined with fuscous, the white emphasized on all the transverse nervures; face olive fuscous, short arcs on the front, a median line on the lower half, a spot on the loræ and the margins of the clypeus and genæ light; below fuscous, legs light, anterior femora annulate.

Genitalia: female, ultimate ventral segment half longer than penultimate, the posterior margin slightly, roundly produced in the middle half, the apex nearly truncate; male valve obtusely triangular, plates broad at base, rapidly narrowing to the acute slightly divergent points, not quite half longer than the valve, concealing the pygofer.

Described from numerous specimens taken between Rist Canon (6,000 feet) and the head waters of the Little Beaver (9,500 feet), one specimen from each, Estes Park, Pinewood and Steamboat Springs, and several from Marshall's Pass, all points being in the mountains of Colo.

DELTOCEPHALUS VINCULATUS, n. sp.

Form and structure of *signatifrons* nearly, broader and more distinctly marked. Pale cinereous marked with rust brown and fuscous; two broad, transverse fuscous bands on the pale elytra. Length, ♀ 3.5 mm., ♂ 3 mm.; width 1.75 mm.

Vertex flat, slightly obtusely angled, one-third wider than the middle length, over three-fourths the length of the pronotum, face and facial angle as in *signatifrons*; pronotum shorter, over twice wider than long; elytra equalling the abdomen in the female, slightly longer in the male, shorter than in *signatifrons*, with a very slight appendix, venation as in *cruciatus*.

Colour: vertex with the margins, a median stripe and a short transverse bar before the middle always light, the remainder of the disc with a very variable amount of fuscous, fading out posteriorly into a rust brown; pronotum irregularly marked with rust brown—in the darker specimens arranged in longitudinal stripes; elytra pale, subhyaline, the nervures white, a broad, slightly oblique band across the middle, another before the tip, and spots on the margins of the second and third apical cells fuscous.

Genitalia: female, ultimate ventral segment short, the lateral angles acute, posterior margin roundly emarginate either side of a large, acutely pointed, black tooth, which is cleft nearly to its base; either side of this tooth the oblique finger-like plates are exposed; male valve obtusely angulate, longer than the ultimate segment, plates broad at base, slightly narrowing to the truncate tips, where they are two-thirds the basal width, two and one-half times the length of the valve, set obliquely together, forming a trough.

Described from numerous specimens swept from the meadows of the Little Beaver, in the mountains west of Fort Collins, Colo.

CTENUCHA CRESSONANA.

In the recent volume published by the British Museum (Natural History), Sir Geo. Hampson refers this species, described by me in 1863, as the same with *C. venosa*. The material in the British Museum from North America: Texas, Grote and Zeller collections, is all *C. venosa*. *C. Cressonana*, from Colorado, is clearly distinct, a larger species more of the type of *C. virginica*, and I can only suppose that unacquaintance with my type has led to the present lumping. I may also add, that it can hardly be settled in the British Museum, whether the Californian *Scepsis Packardi*, which has lighter tinted primaries, and greater extension of a paler yellow on the head, be a local race of *S. fulvicollis* or not. From analogy in the group, it will probably prove distinct.

Roemer Museum, Hildesheim, Germany. A. RADCLIFFE GROTE.

A NEW COSSONUS.

BY ANNIE TRUMBULL SLOSSON.

In the CANADIAN ENTOMOLOGIST (Vol. XXVII., p. 322), the late Dr. John Hamilton, in an interesting article on the Coleoptera of Lake Worth, Florida, referred to a new species of *Cossonus* found there. He speaks of taking, under the bark of a dead limb of the Rubber tree (*Ficus aurea*), five examples of a new *Cossonus*, with basal half of the elytra, metasternum and abdomen rufous. He gives no other description nor does he name the beetle.

In March of the present year, at Miami, on Biscayne Bay, Florida, I found several specimens of what is evidently the same species referred to by Dr. Hamilton. They were under the bark of a fallen and dead Rubber tree. It seems proper and befitting that Dr. Hamilton's name should be associated with this beetle, and I have ventured to describe it below under the specific name of *Hamiltoni*. I trust it will not be considered out of place here for me to speak of my affection, respect and admiration for the good Doctor. We never met face to face, but we corresponded for several years, and he gave me great assistance in my studies among insects. His letters were marked by unflinching courtesy and kindness, gratitude for even the smallest favour from me, appreciation of the most unimportant discovery I might make. As do many others, I remember him and miss him continually.

Cossonus Hamiltoni, n. sp.—Black, shining, with basal half of elytra, the metasternum and abdomen rufous; antennæ and legs dark red. Rostrum stout, finely and closely punctulate, very abruptly and almost transversely-quadrangularly dilated at apex, the dilated portion barely as long as the basal portion.

Thorax oblong, with a triangular depression extending from base to near apex and having a feebly indicated and sometimes slightly elevated median line. The punctures in this depression are coarse and irregular, on sides of thorax smaller and more regular. Elytra slightly wider than base of thorax, surface rather deeply striate at base; striæ with close, deep punctures, but not impressed at apical portion. Prosternum very coarsely and somewhat densely punctate; mesosternum more sparsely punctured; as are also the metasternum and first two abdominal segments.

Length—exclusive of rostrum—2.9–4 mm.

Locality: Miami, Biscayne Bay, Fla.

CORRESPONDENCE.

LEUCOBREPHOS MIDDENDORFI.

When I was the other day looking over some of the back numbers of the CANADIAN ENTOMOLOGIST I came across an account of the taking of *Leucobrephos Middendorfi*, Men., by Mr. Hanham, of Winnipeg. I believe that this species is not generally to be found in collections. Here I cannot call it uncommon. I see, on an average, quite half a dozen specimens every spring, but the moth, from its habits, is most difficult to capture. It appears with the first warm days of spring, flying in the sunshine, low down amongst the stems of short scrub, generally that in which the black cherry predominates, and over banks of melting snow, the remains of drifts, a situation in which it is impossible to use a net, and all one can do is to look at and long for it. When it does venture out into the open its colour so coincides with the prevailing grayness of its surroundings, and renders it so inconspicuous, that, with the addition of its erratic flight, it is most difficult to net. I have only taken two, and I should be sorry to say how many I have missed, and I am not a "bad shot" on the whole. It is always turning up, too, at unexpected and inconvenient times. This spring I walked about one warm day, April 13th, till I was tired without getting a chance. Shortly after I had given the moth up, hearing a commotion among my poultry, I ran down to the stables with my gun. The hawk did not wait for me, but I saw Middendorfi flying very quietly about a heap of manure outside the door of one of my stables, where he could have been easily netted had I but been prepared. My house, stables, etc., are surrounded by scrub of various sorts. E. FIRMSTONE HEATH, Cartwright, Man.

THE TOBACCO FLEA-BEETLE (*Epitrix parvula*) ATTACKING TOBACCO IN BARN.

In Dr. Howard's excellent treatise on this beetle in the Yearbook of the United States Department of Agriculture for 1898, pp. 123-5, no mention is made of the depredations of the insect in tobacco after it has been gathered and hung in the tobacco barn. Last year, in Southern Ohio, these beetles were found to have worked serious injury to tobacco in the fields, especially to the lower leaves. In these fields the beetles ate holes in the larger leaves, and when the leaf was not eaten through the remaining tissue, when dry, would break up and disappear, thus

leaving holes. It seems that while the tobacco is cut and piled in the fields, awaiting transportation to the tobacco barn, the beetles collect among the leaves, remain there, and are removed with the tobacco. After the tobacco is hung up to cure in the barn the beetles continue their attack on the younger and more succulent *upper leaves* (the lower when hung up), and by eating these, especially along the midrib, do even more injury than in the fields, as this last attack not only causes holes in leaves not previously injured, but discolours them also. Between the two attacks the damage is very serious. F. M. WEBSTER.

The Entomological Society of Albany has recently been organized, with an initial membership of about twenty, under the following officers: Dr. E. P. Felt, President; Prof. Charles S. Gager, Vice-President; Mr. Charles S. Banks, Rec. Sec.; Miss Margaret F. Boynton, Corr. Sec.; Prof. H. M. Pollock, Treas. The headquarters of the society will be, for the present, at the office of Dr. Felt, the State Entomologist, where the regular meetings will be held the second Friday of each month. The objects of the society are the promotion of interest in entomological science and the furtherance of fellowship among those interested for their mutual benefit and enjoyment.

SIR,—In your May issue Mr. Lyman reviewed my Synonymic Catalogue of North American Butterflies. There is one point he mentions which deserves explanation. He says: "In this catalogue Dr. Skinner has followed very closely on the lines laid down by Mr. Edwards in his lists, so far as the species are concerned, and with a conservatism which is striking when compared with his rather sweeping radicalism as expressed in his article, 'Impressions received from a Study of our North American Rhopalocera,' in Jour. N. Y. Ent. Soc., IV., 107." Prof. Cockerell, in Science, IX., No. 219, expresses himself in the same way, and says: "There is no tendency to 'lumping' exhibited, which is rather surprising in consideration of some of Dr. Skinner's previously expressed views." I did not think a catalogue the proper place to introduce into the synonymy what have been previously recognized as valid species. No reasons could be given for such changes in a list of names, and if I had "lumped" species they would have represented nothing but the bare opinion of one individual. The proper place to make such changes is in monographs and revisions, where the reasons therefor may

be fully and accurately stated. Where changes were made in the synonymy, in the catalogue, they represented published views on the subject, often expressed by a number of authors. Mr. Lyman himself covers the ground fairly well in the 29th Rept. Ent. Soc. Ont., p. 18, where he says: "In entomology, as no doubt in other branches of natural science, some men are lumpers and others splitters. To the latter I would say that the describing of new species should certainly not be done on the chance of their proving distinct, and to the former that once a form has been described as a new species IT SHOULD NOT BE LUMPED EXCEPT UPON OVERWHELMING PROOF." I may state that I still think quite a number of the names listed in the catalogue will prove synonyms, but we need proof, or opinions based on proof, with the REASONS set forth to prove the case.

HENRY SKINNER, Philadelphia.

NOTE BY MR. LYMAN.—Dr. Skinner is no doubt correct in his view that a cataloguer should not be a lumper, but at the same time it is, I think, usually expected that a catalogue should reflect in some degree the more conservative views of its compiler.

Under *Chionobas Tarpeia* Dr. Skinner very properly explains that there is considerable doubt of the species having ever been taken in North America, and if the species of *Argynnis* of the *Eurynome* group had been followed by a note to the effect that their distinctness was open to considerable doubt, no one could have objected, and such a note would tend to attract more attention to the study of these interesting forms. But Dr. Skinner went much further in the case of the Pacific Coast forms of *Chionobas* in lumping *Gigas*, Butl., *Californica*, Bdl., and *Iduna*, Edw., under *Nevadensis*, Felder.

No monographic work had been done in this case except by Edwards, who maintains the distinctness of the forms. Elwes had "revised" *Oeneis*, but in the case of these species had added nothing to what was already known about them.

H. H. L.

MR. R. A. COOLEY, assistant to Prof. Fernald in the Insectary of the Massachusetts Agricultural College, has received the appointment of Professor of Zoology and Entomology in the Montana State College at Bozeman, Mont. Mr. Cooley has just completed a monograph of the genus *Chionaspis*, which will shortly be published.

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No. 8.

A LIST OF MANITOBA MOTHS.—Part III.

BY A. W. HANHAM, WINNIPEG, MAN.

The Noctuids of this Province, as already known, make a very fair list, and include a number of rare moths, as well as a good percentage of new species. I have seen all Mr. E. F. Heath's things, and his additions to my list are quite numerous; these appear as taken at Cartwright. The Rounthwaite records are Mr. L. E. Marmont's (I have seen his collection), and he has added some rare species. The Brandon records are in some cases my own, as I have visited there the last three summers; others are Mr. H. W. O. Boger's, of that place. I have seen paintings of a number of moths collected at the Douglas swamp by Mr. Criddle, of St. Alban's, Aweme, and these have given me a few extra names.

My best collecting here has been done at light, at Brandon off bloom on the prairies, and I have also had very fair success, both here and at Brandon, from sugaring late in the season (from the middle of August until early in October).

A very large proportion of the species listed have been referred to Prof. John B. Smith, who has been untiring in his efforts to help me, and without whose kind assistance this list would have been impossible, or very incomplete. A few things, still doubtful, remain in his hands for future determination. Others, that would have increased my list, came to grief in the mails. These species, it is hoped, will be taken again during the coming season.

Thyatira scripta, Gosse. Cartwright.

Euthyatira pudens, Gn. Rounthwaite; one at black currant bloom early in May.

Pseudothyatira cymatophoroides, Gn. Common at light, end of June and early in July (1897); also netted at dusk flying along the edge of the woods close to my house.

Pseudothyatira expultrix, Grt. One only, at light, beginning of July.

Leptina latebricola, Grt. Cartwright.

Panthea acronyctoides, Walk. July 12th; one at light.

Raphia frater, Grt. June 17th to July 13th; very common at light, both in 1897 and 1898. In 1895 (June 30th), I got a pair by beating.

One of my specimens is very richly suffused with black on primaries.

Charadra deridens, Gn. June 27th (1897); one at light.

Diphthera fallax, H.-S. June 17th, 24th, etc.; rather rare at light.

Arsilonche albovenosa, Goetze (Henrici, Grt.). Cartwright.

Acronycta Americana, Harr. Have taken the pupæ of this species plentifully in the spring and fall, attached to the under side of boards and logs in woods, but I have never taken more than one at light (July 8th).

Acronycta hesperida, Smith. One at light, about the middle of July (1897).

Acronycta dactylina, Grote. Several at light, early in July.

" *lepusculina*, Gn. Brandon and Rounthwaite.

" *innotata*, Gn. July 13th (1898); one at light.

" *morula*, G. & R. June 21st (1894); one at rest on fence.

" *furcifera*, Gn. June 3rd (1896); one at rest on tree in Elm Park.

" *hasta*, Gn. Cartwright.

" *Manitoba*, Smith. One specimen only.

" *quadrata*, Grote. Cartwright and Douglas.

" *revellata*, Smith. At light, June 19th, and several early in July.

" *grisea*, Walk. Cartwright.

" *falcula*, Grote. June 24th, one at light; also from Cartwright.

" *parallela*, Grote. June 21st (1896), one at rest in the city.

" *ovata*, Grote. Cartwright, and one here at light.

Acronycta hamamelis, Gn. Not uncommon at light; June 18 until middle of July.

Acronycta luteicoma, G. & R. June 10th (1894), one at rest on tree in woods near St. Boniface.

Acronycta sperata, Grote. Cartwright.

" *noctivaga*, Grote. Brandon.

" *emaculata*, Smith. At light, May 13th, etc.

Acronycta impressa, Walk. At light, May 13th to 22nd (Winnipeg), and again middle to end of July (Brandon). These two species were confused until recently, and I cannot speak with certainty as to number taken.

Acronycta oblongata, S. & A. Rare at light, June 22nd, etc.

" *lanceolaria*, Grote. Rounthwaite. A rare and early species.

Microccelia fragilis, Gn. Rare at light, end of June.

“ *diphtheroides*, Gn. Rare at light, end of June and July 1st.
Bryophila lepidula, Grote. June 13th and 20th (1896), two at rest on fences.

Bryophila teratophora, H.-S. A pair at light early in July (1897).

Chytonix palliatricula, Gn. At light, end of June. A number have been secured from pupæ, both here and at Quebec; they are attached to the under side of boards, or in a similar manner to those of *A. Americana*, and I have found both species on the same board.

Rhynchagrotis chardinyi, Bdv. Occasional, at thistle bloom, July 15th, August 3rd, etc., and hiding at the roots of weeds; also fairly plentiful at light, middle to end of July.

Rhynchagrotis rufipectus, Morr. Nice, fresh specimens at light, August 5th to middle of month. At Brandon, at sugar, August 21st to September 1st.

Rhynchagrotis cupida, Grt. Brandon, July 31st (1896), one at bloom; also one here at light in 1897.

Rhynchagrotis placida, Grt. End of July, frequently at light. Brandon, at bloom July and August, and at sugar till nearly end of August.

Rhynchagrotis alternata, Grt. Common at sugar in Elm Park, middle to end of August (1896); also at Brandon in 1898. A few at light, end of July.

Adelphagrotis prasina, Fabr. Rare at light in July.

Platagrotis pressa, Grt. At light and at bloom in July.

Pachnobia littoralis, Pack. (Smith's list, 1643.) June 20th (1896), one under a log on railway bank; also from Cartwright.

Pachnobia Fishii, Grt. (Smith's list, 1638.) May 24th, one at light.

“ *salicarum*, Walk. Cartwright.

Agrotis perattenta, Grt. (Smith's list, 1613.) Several at light during July.

Agrotis ypsilon, Rott. August and September, common at sugar; also at bloom and at light.

Peridroma occulta, Linn. One or two at light, July 23rd, etc.; also at Brandon and Cartwright.

Peridroma astricta, Morr. August 8th, two at light; also at Rounthwaite.

“ *saucia*, Hbn., and var. *margaritosa*, Haw.

A very variable insect. Common at light and at sugar during August and September, and taken as late as October 2nd.

- Noctua Smithii*, Snellen (baja †, Auct.). Another very variable species. Common at Winnipeg, and particularly so at Brandon; at bloom from the middle of July until towards the end of August.
- Noctua Normaniana*, Grt. Not nearly so common as the foregoing, but fairly plentiful at Brandon at bloom, in 1896, from middle to end of July, and taken here at light in 1897, about the same date.
- Noctua bicarnea*, Gn. Occasional, at light, towards end of July.
- Noctua Treatii*, Grt. Three specimens at light, July 2nd and later (1897); not taken last season. Prof. Smith states that it is not uncommon at Calgary.
- Noctua c-nigrum*, Linn. At light, middle to end of July, but not common.
- “ *rubifera*, Grt. Rare at light, beginning of July.
- “ *rosaria*, Grt. Included by authority of Prof. Smith.
- Noctua cynica*, Smith. A few at sugar at Brandon, August 30th and September 1st.
- Noctua fennica*, Tausch. Have taken this species in the house as early as June 20th. It has proved quite a nuisance, both on the Brandon prairies at bloom and here at light, during July. My latest record is August 31st (at light).
- Noctua plecta*, Linn. Three specimens at light on July 25th (1897), and more abundantly last season, also at light.
- Noctua collaris*, G. & R. Several at light at the end of July. Here and at Brandon, by sweeping Solidago, during August. (This species appears to have a decided preference for *S. rigidus*.)
- Noctua haruspica*, Grt. Both seasons this moth has been abundant at light during July, and some evenings by no means a welcome visitor for this reason. The usual form here is paler than the Eastern one.
- Noctua clandestina*, Harr. This species is generally very abundant under loose bark. I noticed it especially so on July 1st (1895) on fence posts. Has been taken as late as August 25th. Not a common insect at light.
- Noctua atricincta*, Smith. Brandon; at bloom, middle of July (1896), a pair only.
- Noctua patefacta*, Smith. Brandon; one at bloom towards end of July (1896).
- Rhizagrotis introferens*, Grt. (Smith's list, 1698.) One in July (1894), bred from the pupa; also at Cartwright.

- Feltia subgothica*, Steph. Very common at bloom, middle of July to end of August. Taken as late as September 23rd.
- Feltia herilis*, Grt. Nearly as plentiful at bloom as *subgothica*, and out with it. Both these species came frequently to light.
- Feltia jaculifera*, Gn. (*tricosa*, Lint.). Until a short time ago this species and *herilis* were both *jaculifera* in my collection, and the moth called *herilis* proves to be *Carneades ochrogaster* (1834). At the present time I only appear to have one specimen of *jaculifera* with a Brandon label, and owing to the confusion of names referred to above, I cannot speak with certainty as to its abundance here.
- Feltia venerabilis*, Walk. Several at light, August 31st to September 4th; also at Brandon at bloom.
- Feltia robustior*, Smith. Three specimens of this new species were taken altogether; the first on August 27th, off golden-rod, another on August 30th, at sugar (in a small swamp), and the third September 1st, also off golden-rod. All three in the vicinity of the Experimental Farm at Brandon.
- Feltia volubilis*, Grt. June 24th, one at light; also from Cartwright and Rounthwaite.
- Porosagrotis murænula*, G. & R. Brandon; rare at sugar, end of August.
- “ *catenula*, Grt. Brandon and Cartwright.
- Porosagrotis mimallonis*, Grt. Brandon; a beautiful, fresh specimen, off golden-rod, on August 27th; also from Cartwright.
- Carneades quadridentata*, G. & R. Brandon; at bloom, August 28th.
- “ *niveilinea*, Grt. A pair at Brandon at light, August 20th.
- “ *Ridingsiana*, Grt. Cartwright.
- Carneades flavicollis*, Smith. This was the most abundant species taken at Brandon, at bloom on the prairies, in 1896 (from middle to end of July), and worn examples were taken there in 1897 until the middle of August. Taken here at light, both in 1897 and 1898, but not in any numbers.
- Carneades velleripennis*, Grt. I took a pair here at light on September 1st, 1897; one at sugar at Brandon on August 27th, 1898, and several off heads of *Solidago* at Carberry on September 14th.
- Carneades scandens*, Riley. Rather plentiful at light for about a week (July 12th, etc., 1898).
- Carneades pleuritica*, Grt. Several at bloom on the prairies at Brandon towards end of July (1896).

- Carneades pitychrous*, Grt. At Brandon, August 14th, 1897, off golden-rod, and quite common off the same flower at Carberry on September 14th, 1898 (during the afternoon).
- Carneades messoria*, Harr. Brandon, at bloom, and Winnipeg, at light, towards the end of July.
- Carneades incallida*, Smith. Brandon and Cartwright.
- Carneades dissona*, Moeschl. Brandon; one on September 1st, I think, at sugar. (Prof. Smith says it was described from Labrador.)
- Carneades tessellata*, Harr. Common both at light and at bloom, during the latter part of July.
- Carneades insulsa*, Smith. Taken at light towards the end of July, and the most abundant species at Brandon, during August, at bloom on the prairies. Has been taken at sugar also. This species is extremely variable, some being almost black, while the rarest and most striking form is almost equally light coloured.
- Carneades detersa*, Smith. Cartwright.
- “ *segregata*, Smith. Cartwright.
- Carneades basalis*, Grt. One specimen only at Brandon, at bloom, in 1896, near the end of July; also seen from Beulah, Man.
- Carneades ochrogaster*, Gn. Very common under logs some seasons, from end of July to end of August. Fairly common here at light, and at Brandon at bloom. Sometimes on the wing during the afternoon. Some of the forms of this variable species rank among our handsomest Noctuids.
- Carneades infusa*, Smith. Prof. Smith, in naming my specimens, says that this new species is allied to *obeliscoides*. It was taken at Brandon on August 31st and September 1st, at sugar and at bloom; also seen from Cartwright.
- Carneades divergens*, Walk. Very common at light, during the early part of July, especially in 1897.
- Carneades redimicula*, Morr. A few at bloom at Brandon in July, 1896, and August, 1898.
- Carneades tesselloides*, Grt. One at light in June.
- Carneades silens*, Grt. Some beauties at light, from 1st July to middle of the month. At Brandon, off bloom, middle of July, 1896. An occasional specimen has none of the dark markings.
- Carneades quinquelinea*, Smith. “It is likely, from the material sent me by Mr. Heath, that this is merely a very sharply marked *incallida*. It should be so referred.”—(J. B. S.) Cartwright.

- Anytus sculptus*, Grt. Not uncommon at sugar here and at Brandon, August 27th to September 5th; also a few at light early in September.
- Mamestra Rogenhoferi*, Moeschl. One specimen each season at light, middle of July. (According to Prof. Smith, this is a species only hitherto recorded from Labrador.)
- Mamestra mystica*, Smith. Occasional, at light, about the middle of July; also from Cartwright.
- Mamestra purpurissata*, Grt. Rather plentiful at bloom at Brandon, middle to end of July, and here at light, towards end of same month. (A rather fine species.)
- Mamestra meditata*, Grt. Rather common at light in July; also sometimes at bloom.
- Mamestra cervina*, Smith. Common at light, end of June to middle of July.
- Mamestra neoterica*, Smith. At light, with *cervina*, but not so numerous. Both these new species, together with *mystica*, were described by Prof. Smith in *Entomological News* (December No. of Vol. IX.).
- Mamestra distincta*, Hbn. Cartwright.
- Mamestra Farnhami*, Grt. A handsome species. Cartwright and Rounthwaite.
- Mamestra atlantica*, Grt. Plentiful at light, from the middle of June until nearly the end of July.
- Mamestra desperata*, Smith (=1953 = *radix*, Wek.). A few at light, middle to end of June.
- Mamestra subjuncta*, G. & R. Rare at light, end of June.
- “ *grandis*, Bdv. Rare at light, end of June.
- “ *trifolii*, Rott. Rounthwaite.
- Mamestra rosea*, Harv. One at light, end of June. Another from Brandon (pupa found April 24th, moth evolved May 15th).
- Mamestra picta*, Harr. A beauty, at light, July 12th (1898).
- “ *lubens*, Grt. A few at light, end of June and early in July.
- “ *assimilis*, Morr. Several at light, first part of July.
- Mamestra adjuncta*, Bdv. A beautiful species when in good condition; taken in July, and appears to be rare here.
- Mamestra legitima*, Grt. From Cartwright and Rounthwaite. Rather an early *Mamestra*, and quite richly coloured when fresh.

Mamestra lilacina, Harv., and

form *illabefacta*, Morr. This species does not seem to be on the wing until July, but during that month, especially in 1897, it was exceedingly common at light.

Mamestra obscura, Smith. Cartwright.

Mamestra renigera, Steph. Common at light, middle to end of July, and at bloom on the prairies.

Mamestra olivacea, Morr. This species appears to be out from the middle of July to the middle of August, and is common both at light and at bloom. It shows quite a range of variation.

Mamestra incurva, Smith. Cartwright.

Mamestra lorea, Gn. A nuisance at light, especially about the beginning of July.

Mamestra quadrannulata, Morr. Rounthwaite. (This, I understand, is a good catch.)

Mamestra anguina, Grt. (var. *larissa*, Smith.) Brandon.

" *vicina*, Grt. Brandon; one at bloom in July.

Mamestra gussata, Smith. Brandon. (Described from Calgary. Quite a pretty species.)

Hadena niveivenosa, Grt. Common at light, at the end of July, and taken on the wing during the day.

Hadena stipata, Morr. August 15th; three specimens at bloom at Brandon.

Hadena passer, Gn. Several at light in 1897, about the middle of July.

" *remissa*, Hbn. One at light at the beginning of July.

" *suffusca*, Morr. (= *illata*, Walk.) Several at light early in July.

" *finitima*, Gn. End of June, one at dusk.

Hadena lateritia, Hbn. Taken under logs on July 13th, etc., at bloom, and common at light early in July.

Hadena dubitans, Walk. (= *sputatrix*, Grt.) As common as the preceding species, and out at the same time.

Hadena plutonia, Grt. Cartwright.

" *impulsa*, Gn. Two or three at light, July 15th, etc.

Hadena devastatrix, Brace. Common under logs, and at light during July, and towards the end of September have taken fresh specimens at sugar and at light.

Hadena arctica, Bdv. At bloom in garden, and came freely to light in July.

Hadena relecina, Morr. Cartwright and Rounthwaite. I think Mr. Marmont took his late, at sugar.

Hadena lignicolor, Gn. One of the abundant species during July at light.

Hadena transfrons, Neum. Occasional, at Brandon, off golden-rod, both during the day and by sweeping after dark.

Hadena indirecta, Grt. Cartwright.

“ *didonea*, Smith. Cartwright.

“ *modica*, Gn. One or two only, at light, towards the end of July.

Hadena mactata, Grt. (This name is on my authority. I have looked over the specimens received from Mr. Hanham, and believe now that I have two good species, neither of them *mactata*, though both nearly allied to it.—J. B. Smith.) Very common at sugar, from August 24th to nearly the end of September; also taken at light.

Hadena miseloides, Gn. July 19th; one at light.

Hadena fractilinea, Grt. (No. 2060.) Brandon; a few at bloom, and generally off golden-rod.

Xylophasia semilunata, Grt. (No. 2023.) Cartwright.

Trachea delicata, Grt. June 18th to July 19th; at light, but only a few taken.

Hillia crasis, H. S.;

also form *senescens*, Grt. Rare at light, and at sugar in September.

Hillia algens, Grt. Rather plentiful at sugar, end of August and beginning of September; also some at light.

Oligia festivoides, Gn. Rare at light, in July.

“ *versicolor*, Grt. Rare at light in July.

Platyperigea præcuta, Smith, (?). Rounthwaite; one at sugar in September. (Prof. Smith says his type from Colorado is smaller and less marked.)

Hyppa xylinoides, Gn. A few at light, and on fences early in July. Does not appear to be so plentiful as in the East.

Homohadena badistriga, Grt. A few at light, with seasons about the middle of July.

Homohadena stabilis, Smith. Taken at light on the wing, about the same time, and by no means common.

Oncocnemis atrifasciata, Morr. Taken at Brandon, Carberry, Cartwright, and Rounthwaite, but not yet at Winnipeg. Mr. Boger and Mr. Marmont have taken this beautiful insect at light, the latter, I believe,

in some numbers. I was lucky enough to take one at Rounthwaite at bloom, after dark on August 26th (1897), and on September 14th (1898) I got another at Carberry, flying in the sun about golden-rod. *Oncocnemis Saundersiana*, Grt. One at Carberry, on the same occasion as above recorded.

Oncocnemis Chandleri, Grt. Brandon and Rounthwaite.

" *cibalis*, Grt. Cartwright.

Oncocnemis viriditincta, Smith. A pair at Brandon, and one at Rounthwaite.

(To be continued.)

TWO BRITISH AMERICAN NOCTUIDS.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

Among the material sent me for determination by Mr. A. W. Hanham were several species that appear to be undescribed. Some of these have been already published, and others are in the hands of publishers. The following two species are presented at this time because they are referred to in Mr. Hanham's list now published in the CANADIAN ENTOMOLOGIST.

Feltia robustior, n. sp.

Ground colour a sooty gray or brown, with black and white powderings on the body and fore wings. Head slightly darker inferiorly and again behind the antennæ. Collar with a black or brown central line, and a less defined dusky shade edged with white scales at tip. Patagiæ with a brown submarginal line, and the vague discal tufting is also edged with dusky. Abdomen of the usual dirty pale gray. Primaries with the markings fairly well defined. Basal line whitish, diffuse, not well marked, extending into the submedian interspace. T. a. line geminate, black, the included space marked with white scales: from the costa at one-third from base, inwardly oblique to the median vein where it forms nearly a right angle, is then outwardly curved to the internal vein, below which it runs obliquely outward to the inner margin at its middle. The tendency seems to be to obscure the lower portion of this line. T. p. line single, blackish, broken, followed and emphasized by white scales which tend to lighten the s. t. space. As a whole it is outcurved over the cell and very evenly oblique from that point. S. t. line marked by white scales, preceded by a series of black, saggitate marks and forming a W which reaches the outer margin on veins 3 and 4. A series of black terminal

lunules. Fringes with a pale line at base and with a brown interline. All the veins are narrowly black and edged on each side with white scales, which gives the wing a rayed appearance. Claviform long, extending to the middle of the median space, very heavily outlined in black, so as to form the most prominent feature of the wing. Orbicular small, ovate, of the ground colour, black margined. Reniform small, of the ground colour or a little paler, partly outlined in black. Secondaries almost evenly smoky gray, with a vague brown discal lunule and terminal line. Beneath, primaries smoky gray, with a vague discal spot and a series of distinct black terminal lunules. Secondaries powdery white, with a large blackish discal blotch and a series of distinct black terminal lunules.

Expands 1.60-1.68 inches = 40 to 42 mm.

Habitat.—Brandon, Manitoba, August 27, Sept. 1, 1898.

Two male specimens, No. 441, from Mr. Hanham, who says there is a third in Mr. Boger's collection. The new species is near *venerabilis*, but the pectinations of the antennæ are not so long, and, while the body is fully as heavy, the primaries are proportionately longer. The median lines are unusually distinct as compared with its allies, while the pale edging on the median and vein 2 does not tend to form a pale or discoloured streak or band, as in the other species. The antennæ extend to the inception of the t. p. line on the primaries, are well pectinated (male), the branches very densely ciliated.

Philometra Hanhami, n. sp.

Ground colour dark sooty brown, the secondaries lighter in tint. Head and thorax without markings, the abdomen deep mouse gray, also immaculate. Primaries with all the ordinary lines present, but very faint and not at all contrasting. Basal line single, black, very close to the base of the wing and usually marked only by a black dot on the median vein. T. a. line single, blackish, with two wide and one small outcurve, also a little outcurved as a whole. T. p. line blackish, single, narrow, irregular, outcurved over the cell and a little incurved in the s. m. interspace. S. t. line pale, preceded by a black shading, which relieves it, with three outcurves which, on the inward bends, are marked by obtuse angles instead of curves. Orbicular wanting. Reniform kidney-shaped, moderate in size and intensely black, making it the most obvious ornamental character. A vague median shade is visible in some specimens. Secondaries paler basally, with a yellowish tinge. Outwardly there is a diffuse,

pale s. t. line, and at about the middle is a narrow smoky transverse line. Beneath smoky brown, paler toward base. A smoky median line, a brown discal spot and a vague outer pale transverse line: all variable in distinctness. The antennæ of the male are pectinated, the branches setose and shorter than in the other described species. The legs are defective in the single example before me, but one remaining fore leg indicates the usual brushlike tuftings. The antennæ in the female have the joints marked and furnished with well-defined lateral bristles.

Expands 1-1.10 inches = 25-27 mm.

Habitat.—Winnipeg, Manitoba; Centre, N. Y., July 4, 1879.

Seven specimens are before me, 1 male and 6 females, all more or less imperfect, having met with hard usage in transit. All but one were collected by Mr. A. W. Hanham, who has others, and does not find the species uncommon.

One female was taken by the late W. W. Hill, of Albany, and bears a label in Mr. Grote's handwriting: "Probably new: too poor to serve as type." The specimen reached me some years ago for determination, but has not until the present time found fellows to which it could be referred.

The new form differs at once from the other species of *Philometra* by its dark sooty brown primaries, and from all the species in the subfamily by the contrasting black reniform. The palpi are more sickle-shaped than usual in this genus and more as in *Zanclognatha*, to which I was inclined to refer the species until the male came to hand; but the antennæ do not show the peculiar nodosity at basal third, which is always present in that genus.

ASPIDIOTUS CONVEXUS, COMST. — A CORRECTION.

BY C. L. MARLATT, WASHINGTON, D. C.

The pioneer work done by Prof. Comstock on the Coccidæ of America has put all workers in this group of insects under lasting obligation to him. It was inevitable, however, that, taking up a new subject and handling a vast amount of material for the first time, mistakes should have occurred. An instance in point is the curious mixing up of the material which occurred in the case of the description of the species known as *Aspidiotus convexus*, Comst.

In October, 1880, Prof. Comstock brought from Mr. Ellwood

Cooper's ranch at Santa Barbara, Cal., a scale insect infesting the leaves and twigs of eucalyptus, olive, pear, and fig. The same insect was found on willow at Los Angeles, Cal. From this material, and from other specimens received from various parts of the country, was described the species *Aspidiotus rapax*, Comst. (= *camelliae*, Sign.), which was named the greedy scale on account of its wide range of food plants.

Collected at Santa Barbara at the same time as the above was a scale, described as being identical with the last, except appearing somewhat larger. It occurred on the bark of the trunk and larger limbs of willow trees, the original specimens being now in the Department collection. Prof. Comstock, in his description of *Aspidiotus convexus*, designates this as the type material of the species named. An examination made some years later, however, showed that the willow scale in question, supposed to represent *convexus*, was in reality Comstock's *rapax*, which latter had also been found on willow in California, as noted, as well as in other places.

It was evident that some mistake or confusion of slides had been made, and the species *convexus* was deemed non-existent. Later, however, a scale insect was received from the West, on willow, which seemed to agree with the description of *convexus* and was referred to this species, and in the course of years a considerable quantity of material referable to *convexus* accumulated in the Department collection, the supposition now being that the type, accidentally or otherwise, had actually been before Prof. Comstock, and had subsequently either been lost or mislaid. The fact, however, that there existed no type material of *convexus* left the matter still open to some doubt, and made it desirable to study, if possible, the preparations in the private collection of Prof. Comstock representing the species.

At the request of the writer, Prof. Comstock kindly sent for examination his type slides of *convexus*. The material received consisted of seven slides, three of which are marked "*convexus*, Comst., type," and proved, astonishingly enough, to belong to *ancylus*, as did also two of the other slides labelled "240 Sub. 1." The other two slides labelled "240 Sub. 2" proved to be *juglans regia*. The "type slides" of *convexus* are labelled "No. 746, *Aspidiotus* on willow, Santa Barbara, Cal.," apparently connecting them with the willow scale collected at that place.

An examination of the type material now brought together for the

first time, and of Prof. Comstock's description of the species in the Agricultural Report for 1880 (page 219), and also his figure of the species (l.c., Plate XII., fig. 8), throws a good deal of light on the difficulty and clears up the confusion which had hitherto existed.

The scale on willow collected at Santa Barbara, Cal., is typical *rapax* (= *camelliæ*), agreeing with the other material of this species collected at the same time and place. The old slide material in the Department of Agriculture, made from the willow scale in question, and later preparations made by the writer, confirm this determination.

The slide material taken away by Prof. Comstock, and labelled as type material, is *ancylus*; the additional material referred to the species being divided between *ancylus* and *juglans regia*, as noted.

In the characterization of "*convexus*," Prof. Comstock undoubtedly had this willow material before him, and, in fact, recognized the scales as being indistinguishable from those of *rapax*, a fact noted in the description. At the same time he studied balsam preparations associated with the pinned willow bark, and which he naturally supposed to have been made from the same, noted the presence of the grouped glands distinguishing the species at once from *rapax*, and characterized the insect as a distinct species. In the second paragraph of the description, however, he points out the resemblance in the terminal segment of the "*convexus*" female with the female of *ancylus*. Furthermore, an examination of the figure given of *convexus* indicates that it was undoubtedly drawn from one of the misplaced slides of *ancylus*, of which species it is a characteristic delineation, and is subgenerically distinct from the group to which *rapax* and the supposed *convexus* belong. Through some unfortunate accident, these slides of *ancylus* had become associated with the convex willow scale from California, and an error, very difficult to discover and correct, was made.

It has already been noted that a large quantity of material has accumulated in the collection of the Department which has been referred to *convexus*, and the actual existence of a species closely allied to *rapax*, but distinguished from the latter by the presence of grouped glands, is well established. This scale, in fact, has been described two or three times. It is undoubtedly the species described by Prof. Comstock as *cydonia* from quince in Florida. Prof. Comstock recognized

the close relationship of this species to his *convexus*, but having described and figured the adult female of the latter from *ancyllus*, the fact of the identity of the two was obscured.

The scale material which we have determined as *convexus* must, therefore, now be referred to *cydoniæ*, Comst. The name *convexus* becomes a synonym of both *camelliæ* and *ancyllus*, since the covering scale was described from material representing the former, and the female insect from material representing the latter, species.

Aspidiotus cydoniæ, Comst., has been three times since described as distinct by Prof. T. D. A. Cockerell, his species *Crawii*, *punica*, and his variety *lateralis* of Newstead's species *diffinis* belonging to *cydoniæ*. The error in referring "lateralis" to *diffinis* was doubtless occasioned by the fact that the material from which the variety was described for the most part represented immature females, judging from an examination of part of the type material deposited in the National collection.

The *cydoniæ* recognized by E. E. Green in Ceylon (Coccidæ of Ceylon, I., p. 62, Pl. XIV.), and afterwards made the type of *Greenii* by Cockerell, was correctly placed by Green. I may add that the material in the National collection determined by Professor Cockerell as *Greenii* is a mixture of *camelliæ* and *cydoniæ*. The material on banana collected by Mr. Townsend in Mexico (7857) is referable to *cydoniæ*, and also the palm scale collected by Cockerell at Mesilla, N. Mex. The scale on Japanese palm collected at Mexico City, Mex., December 6th, 1897, is a mixture of *cydoniæ* and *camelliæ* in the proportion of about 3 to 1, judging from a single slide mount which contains three females of *cydoniæ* and one of *camelliæ*.

The synonymy of the two species, *cydoniæ* and *camelliæ*, is as follows:

| <i>Aspidiotus camelliæ</i> , Sign. | <i>Aspidiotus cydoniæ</i> , Comst. |
|---|------------------------------------|
| Synonyms: <i>convexus</i> , Comst. (in pars). | Synonyms: <i>Crawii</i> , Ckll. |
| <i>euonymi</i> , Targ. | <i>diffinis</i> , Newst., var. |
| <i>lucumæ</i> , Ckll. & Twn. (M. S.) | <i>lateralis</i> , Ckll. |
| <i>rapax</i> , Comst. | <i>Greenii</i> , Ckll. |
| | <i>punica</i> , Ckll. |

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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(Paper No. 3.)

SUBFAMILY IV.—Thyreopinæ.

The absence of a distinct ridge, carina or crest on the mesopleura just in front of the middle coxæ, an important structural character first made use of by Kohl, the recurrent nervure in the front wings joining the first cubital cell at or at least nearer the middle than the apex, and the great differences noticeable in the antennæ and the metathorax, readily separate this group from the Crabroninæ.

To me the Thyreopinæ seem to represent a large and distinct group, allied to the others it is true, but yet quite distinct, and divisible into many easily recognizable subgenera. It will be seen also that instead of suppressing the genera erected by some of the older entomologists, which fall in this group, and lumping them with Crabro, as has been done by Kohl and Fox, I have instead recognized all of the genera of Latreille, Dahlbom, Lepeletier, etc., and besides have founded some additional genera. All of these, I think, can be easily recognized by the student, with the use of the following table :

Table of Genera.

Ocelli arranged in an equilateral triangle or nearly . . . , the lateral ocelli about as far from each other as to the front ocellus ; thorax more or less smooth or polished, shining, the metathorax feebly sculptured, almost smooth, its posterior face sometimes rugulose 6.

Ocelli arranged in an obtuse triangle . . . , the lateral ocelli being about twice as wide from each other as to the front ocellus ; thorax with at least the metathorax rugulose, opaque, often very coarsely sculptured, the metanotum usually without, or with a poorly defined triangular or semi-circular area, the posterior face often with a distinctly defined *cordate area* ; the recurrent nervure joins the cubitus at or distinctly beyond the middle of the first cubital cell ; abdomen always marked with yellow above ; pygidium in ♀ always flat, triangular.

Males 4.

Females :

Superorbital foveæ sharply defined, large oblique, or at least

indicated by a large oblique depression on the surface. 3.
 Superorbital foveæ always wanting, never sharply defined, at most indicated only by a scarcely perceptible depression between the lateral ocelli and the eyes.

Third antennal joint longer than the fourth ; metanotum with the semicircular area very coarsely, irregularly reticulate or rugose, the posterior face reticulate or transversely wrinkled, with a deep median sulcus; recurrent nervure uniting with the cubitus at or a little before the apical third of the cubital cell ; abdomen alutaceous or coriaceous, impunctate, the first segment highly polished. *Anothyreus*, Dahlb.

[Type *A. lapponicus*, Dahlb.]

Third antennal joint shorter than the fourth ; metathorax coarsely irregularly reticulate, the posterior face smoother, not transversely wrinkled ; mandibles at apex truncate or bluntly rounded, with a small tooth within before apex ; clypeus anteriorly quadrately produced medially, with acute lateral angles. *Paranothyreus*, Kohl.

[Type *C. hilaris*, Smith.]

3. Mandibles at apex bidentate, the inner tooth the larger, bluntly rounded ; thorax closely punctate, opaque, and often with longitudinal aciculations ; metathorax punctate, with a median longitudinal sulcus posteriorly, the triangular area at base rather small reticulate or alveolate.

Clypeus anteriorly broadly quadrately produced ; recurrent nervure in front wings received by the cubital cell much before its apical third. *Synothyreopus*, Ashm., n. g.

[Type *C. tumidus*, Pack.]

Clypeus anteriorly, not quadrately produced, rounded, or at most semicircularly produced ; recurrent nervure in front wings received by the cubital cell at or beyond the apical third, rarely before. *Thyreopus*, Latreille.

[Type *C. cribrarius*, Fabr.]

4. Anterior legs abnormally developed, the trochanters, the femora or tibiæ, or altogether broadened, most frequently with a shieldlike expansion on the tibiæ. 5.
 Anterior legs normally developed, the tibiæ without a shieldlike expansion.

Superorbital foveæ wanting, never sharply defined, at the most represented by slight glabrous depressions; middle tibiæ with an apical spur.

Metathorax coarsely irregularly rugose, with a deep furrow on the posterior face, the latter also usually transversely wrinkled; mesonotum finely coriaceous, opaque, very sparsely punctate; anterior and middle tibiæ with a sparse flocculus beneath.....Anothyreus, Dahlbom.

[Type A. lapponicus, Dahlb.]

Metathorax coarsely reticulate; pronotum with acute lateral angles anteriorly; mesonotum closely punctate, opaque, not aciculate; mesopleura with a conical tubercle before the middle coxæ; trochanters and femora beneath clothed with a rather long, thick, white flocculus.....Paranothyreus, Kohl.

[Type C. hilaris, Smith.]

5. Superorbital foveæ sharply defined, distinct, oblique, usually dull or opaque at bottom; metathorax rugose, opaque, with a deep median sulcus on posterior face; mesonotum closely punctate, opaque, often longitudinally aciculate or striate.

Antennæ with the flagellum not fusiform, hardly compressed, the joints not or scarcely wider than long, the first two always longer than wide; clypeus anteriorly quadrately produced; anterior tarsi not especially broad, without an

appendage.....Synothyreopus, Ashm., n. g.

[Type C. tumidus, Pack.]

Antennæ with the flagellum fusiform, compressed, the joints much widened, the first three or four joints fully twice as wide, or wider, than long; clypeus anteriorly, not quadrately produced, at the most semicircularly produced; anterior tarsi broad, dilated, with an appendage.....Thyreopus, Lep., et. Br.

[Type C. cribarius, Fabr.]

6. The recurrent nervure in front wings received by the cubital cell at or near the middle, or only slightly beyond the middle; abdomen usually immaculate, without yellow marks; mandibles at apex bidentate or tridentate; eyes strongly convergent below, the antennal sockets in consequence being very close to the eye margin.....7.

The recurrent nervure in front wings received by the cubital cell distinctly or considerably beyond the middle; abdomen most frequently marked with yellow, rarely immaculate; metathorax feebly sculptured, with a well-defined cordate area on the posterior face..9.

7. Males8.

Females :

Superorbital foveæ sharply defined, linear or wedge-shaped, and usually connected with a depression behind the lateral ocelli; abdomen polished impunctate, or at most finely, microscopically punctate; pygidium narrowed, foveated. *Blepharipus*, Lepel., et.Br.

[= *Cœlocrabro*, Thoms.*]

[Type *B. nigrita*, Lepel.]

Superorbital foveæ wanting, or never sharply defined, indicated only by a slight cicatrix or glabrous mark; metanotum with a well-defined semicircular area, divided by a median grooved line; abdomen smooth, impunctate, the pygidium flat, triangular, not excavated, and clothed with glittering

hairs *Crossocerus*, Lep., et. Br.

[Type *C. scutatus*, Lepel.]

8. Superorbital foveæ sharply defined; metathorax with the cordate area *not* well defined, usually subobsolete; front legs and antennæ normal; middle tibiæ with an apical spur.

Clypeus anteriorly narrowly produced and roundly emarginate; head quadrate or subquadrate, the superorbital foveæ linear or wedge-shaped; abdomen not or scarcely longer than the head and thorax united, polished..... *Blepharipus*, Lepel.

= *Cœlocrabro*, Thoms.

[Type *B. nigrita*, Lepel.]

Clypeus narrowly produced medially and sinuate on each side of the production; head large, nearly quadrate, the superorbital foveæ distinct but not large, pyriform; abdomen not very long..... *Epicrossocerus*, Ashm., n. g.

[Type *C. insolens*, Fox.]

Clypeus subsemicircularly produced, not emarginate; superorbital foveæ curved, linear or lunulate; hind tibiæ strongly clavate; abdomen greatly elongate, about twice as long as the head and

* *Blepharipus* was subdivided by Morawitz and others before Thomson, which left *nigrita* as the type.

thorax united. (♀ unknown). Alaska..Dolichocrabro, Ashm., n.g.

[Type D. Wickhamii, Ashm.]

Superorbital foveæ not sharply defined, wanting, or at most indicated by a cicatrix or a slightly depressed glabrous line ; metathorax with a well-defined cordate area ; clypeus not emarginate anteriorly.

Front legs abnormal, the tibiæ *with* a shieldlike

expansion Crossocerus, Lepel.

[Type C. scutatus, Fabr.]

Front legs normal or nearly, the tibiæ *without* a shieldlike expansion, the tarsi somewhat flattened, or at

most subdilated..... Stenocrabro, Ashm., n. g.

[Type C. planipes, Fox.]

9. Males 10.

Females :

Superorbital foveæ wanting, or at most indicated by a glabrous depression, the occipital line or margin produced into a tooth beneath the temples ; mandibles without a tooth within, truncate or blunt at apex, indistinctly bidentate ; metathorax very feebly sculptured, with a well-defined, smooth, semicircular area at base ; abdomen smooth, sometimes with yellow maculæ ; anal lobe in hind wings as long as the submedian cell. Hoplocrabro, Thomson.

[Type C. quadrimaculatus, Fabr.]

Superorbital foveæ distinct, sharply defined, pear-shaped or broadly depressed, the occipital line normal, not ending in a tooth beneath the temples ; ocelli in an equilateral triangle ; mandibles with a tooth within near the middle, at apex tridentate ; metathorax almost smooth, shining, with a well-defined semicircular area at base ; abdomen polished ; the first segment somewhat lengthened, the pygidium triangular, punctate ; anal lobe in hind wings shorter than the submedian cell..... Cuphopterus, Morawitz.

= Blepharipus, Auc. *pars*.

[Type C. subulatus, Dahlb.]

10. Superorbital foveæ wanting, or at most indicated by a glabrous depression, never sharply defined, the occipital line or margin produced into a tooth beneath the temples ; mandibles *without* a tooth within ; at apex bidentate..... Hoplocrabro, Thomson.

Superorbital foveæ distinct, sharply defined, pear-shaped, or broadly depressed ; mandibles *with* a tooth within, at apex bidentate..... Cuphopterus, Morawitz.

North American Species.

- (19) ANOTHYREUS, Dahlbom. (23) BLEPHARIPUS, Lepel. et Brullé.
 (1) *A. hispidus*, Fox, ♀. (1) *B. impressifrons*, Smith, ♀ ♂
 =tibialis, Say, nec Fab.
 (20) PARANTHYREUS, Kohl. (1) *P. cingulatus*, Pack., ♀ ♂. (2) *B. Harringtonii*, Fox, ♀.
 (2) *P. cognatus*, Fox, ♀ ♂. (3) *B. nigricornis*, Prov., ♀ ♂.
 (3) *P. hilaris*, Smith, ♀ ♂. (4) *B. nigrior*, Fox, ♀.
 (4) *P. Snowii*, Fox. (5) *B. cinctipes*, Prov., ♀ ♂.
 (21) SYNOTHYREOPUS, Ashmead. (6) *B. ater*, Cr., ♀ ♂.
 (1) *S. conspicuus*, Cr., ♀. (24) EPICROSSOCERUS, Ashmead.
 (2) *S. advenus*, Smith, ♀ ♂. (1) *E. insolens*, Fox.
 (3) *S. thyreophorus*, Kohl, ♀ ♂. (25) DOLICHOCRABRO, Ashmead.
 (4) *S. vernalis*, Pack., ♀ ♂. (1) *D. Wickhamii*, Ashm., ♂.
 (5) *S. virgatus*, Fox, ♂. (26) CROSSOCERUS, Lepel. et Brullé.
 (6) *S. incertus*, Fox, ♀ ♂. (1) *C. Harrisii*, Pack., ♂.
 (7) *S. tumidus*, Pack., ♀ ♂. (2) *C. sulcus*, Fox, ♀ ♂.
 (8) *S. tenuiglossus*, Pack., ♀ ♂. (3) *C. pictipes*, Fox, ♂.
 (22) THYREOPUS, Latreille. (4) *C. incavus*, Fox, ♀.
 (1) *T. largior*, Fox, ♀ ♂. (5) *C. minimus*, Pack., ♀.
 (2) *T. pleuralis*, Fox, ♀ ♂. (6) *C. propinquus*, Fox.
 (3) *T. monticola*, Pack., ♀ ♂. (7) *C. maculiclypeus*, Fox, ♀ ♂.
 (4) *T. pallidus*, Fox, ♀ ♂. (8) *C. lentus*, Fox, ♀.
 (5) *T. aequalis*, Fox, ♀. (27) STENOCRABRO, Ashmead.
 (6) *T. discretus*, Fox, ♀. (1) *S. planipes*, Fox, ♂.
 (7) *T. argus*, Pack., ♀ ♂. (2) *S. tarsalis*, Fox, ♂.
 (8) *T. tenuis*, Fox, ♀ ♂. (3) (?) *unicus*, Pattn., ♀.
 (9) *T. medius*, Fox, ♀ ♂. (28) HOPLOCRAURO, Thomson.
 (10) *T. Provancheri*, Fox, ♀. (29) CUPHOPTERUS, Morawitz.
 (11) *T. crebellifer*, Pack., ♂. (1) *C. maculipennis*, Smith, ♀ ♂.
 (12) *T. latipes*, Smith, ♂. (2) *C. confertus*, Lepel.
 (13) *T. vicinus*, Cr., ♀. (3) *C. nitidiventris*, Fox, ♀ ♂.
 (14) *T. alpestris*, Cam., ♂. (4) *C. ventralis*, Fox, ♀.
 (15) *T. alticola*, Cam., ♂.
 (16) *T. peltasta*, Kohl, ♂.

SUBFAMILY IV.—Rhopalinæ.

This group is readily separated from the others by the petiolate abdomen, or at least by the long and petioliform first abdominal segment, which is usually without distinct lateral carinæ.

The subfamily otherwise, however, seems to be closely allied in the structure of the thorax, and in wing characteristics, to both the *Lindeninae* and the *Thyreopinae*; but besides the long, petioliform first abdominal segment, which separates the group from both, it is also separated from the former by the bidentate, not simple, mandibles, while from the latter it is also distinguished, as a rule, by antennal, mandibular, palpal and other differences.

The group may be divided into the following subgenera :

Table of Genera.

Maxillary palpi 5-jointed; labial palpi 3-jointed; mandibles bidentate at apex, very exceptionally blunt at apex in ♀.3.

Maxillary palpi 6-jointed.

Labial palpi 3-jointed; mandibles bidentate.....2.

Labial palpi 4-jointed.

Mandibles at apex in ♀ tridentate, in ♂ bidentate; mesopleura bounded anteriorly and posteriorly by a sharp ridge or carina; head, thorax and abdomen opaque, very finely rugulose; body of abdomen oval or subovate, marked with yellow, the petiole or first segment subclavate; pygidial area in ♀ narrowed, foveate; recurrent nervure in front wings received by the cubital cell beyond the middle; antennæ in ♀ 12, in ♂ 13-jointed.....*Dasiproctus*, Lep. et Br.
= *Megapodium*, Dahlb.

[Type *D. bipunctatus*, Lep.]

Mandibles in both sexes bidentate; ocelli triangularly arranged; mesopleura bounded by a sharp carina anteriorly, but not posteriorly; head and thorax finely, closely, minutely punctate; metanotal area distinct, smooth, polished, with some striæ at base, the posterior face with the cordate area well defined; abdomen clavate, impunctate, not marked with yellow, the petiole subclavate; pygidial area triangular, flat, not foveate; recurrent nervure in front wings received by the cubital cell a little before the middle; antennæ in ♀ 12-jointed, the third joint the longest, twice the length of the pedicel. (Male unknown).....*Synorhopalum*, Ashm., n. g.

[Type *C. decorus*, Fox.]

2. Face below rather broad, the eyes only slightly convergent towards

the clypeus; clypeus very short, not triangularly acute; antennal sockets somewhat distant from each other, but still wider from the eye margin than to each other; third antennal joint much shorter than the fourth, the latter being the longest joint; abdomen marked with yellow, the pygidium in ♀ narrow, somewhat lengthened.....Brachymerus, Dahlb.

=Tracheliodes, Morawitz.

=Fertonius, Perez.

[Type B. megerlei, Dahlb.]

Face narrowed below, the eyes convergent towards the clypeus; ocelli subtriangularly arranged; clypeus anteriorly medially produced, the angles of same acute; antennal sockets nearer to the eye margin than to each other, but still close together; third antennal joint not longer than the fourth, but shorter than the second or pedicel; mesopleura not bounded by a carina posteriorly; metanotal area smooth, with some short striæ at base; abdomen clavate, not marked with yellow, the pygidial area triangular, rounded at apex; antennæ in ♂ 13-jointed, normal, none of the joints emarginate or compressed; mandibles with a large tooth or process beneath near the base.....Alliognathus, Ashm., n. g.

[Type C. occidentalis, Fox.]

3. Abdominal petiole clavate, subglobosely swollen at apex.....4.
Abdominal petiole subclavate, or very gradually thickened towards apex, never subglobosely swollen at apex.

Mesosternal suture wanting or indistinct.

Head obtrapezoidal; eyes pyriform, convergent anteriorly towards the clypeus; ocelli arranged in a regular triangle; body feebly coriaceously opaque; recurrent nervure in front wings received by the cubital cell at about the middle; pygidium triangular, punctate, distinct.Microcrabro, Saussure.

[Type M. micromegus, Sauss.]

Head similar, but larger, a little longer than wide, the temples very broad; superorbital foveæ sharply defined, linear; ocelli arranged in an equilateral triangle, and rather widely separated; a strong spine between bases of antennæ; head and thorax somewhat coarsely, rugosely punctate; recurrent nervure in front wings received by the cubital cell a little before the middle; pygidium triangular, flat; antennæ in ♀

12-, in ♂ 13-jointed; the terminal joint in the latter compressed, dilated; the others normal. . *Moniæcera*, Ashm., n. g.

[Type C. abdominalis, Fox.]

Mesosternal suture distinct, extending to the middle coxæ, and distinctly separating the mesosternum.

Head subquadrate or obtrapezoidal, wider than long, the temples not especially broad; mandibles at apex in ♀ truncate, blunt, in ♂ bidentate; antennæ in ♀ 12-, in ♂ 13-jointed, the latter deformed, some of the joints emarginate beneath; metathorax coarsely rugose; recurrent nervure in front wings received by the cubital cell distinctly beyond the middle; pygidium in ♀ flat, triangular. . *Podagrirus*, Spinola.

[Type P. Gayi, Spin.]

4. Mesosternal suture wanting; mandibles in both sexes bidentate; ocelli triangularly arranged.

Metathorax smooth, the cordate area on the posterior face, more or less distinctly defined; antennæ in ♀ 12-, in ♂ 13-jointed, the latter deformed, some of the flagellar joints depressed or emarginate beneath; recurrent nervure in front wings received by the cubital cell far beyond the middle. . . *Rhopalum*, Kirby.

=*Corynopus*, Lep., et Br.

[Type R. tibiale, Fabr.]

Metathorax feebly punctate, the cordate area less distinct; antennæ in ♀ 12-, in ♂ 13-jointed, the latter normal, none of the joints emarginate; recurrent nervure in front wings received by the cubital cell at or near the middle. . *Physoscelis*, Lepel., et Br.

[Type C. clavipes, Linne.]

[=rufiventris, Panz.]

North American Species.

- | | |
|---|---|
| (30) <i>DASYPROCTUS</i> , Lepeletier and Brullé. | (2) <i>M. asperatus</i> , Fox, ♂. |
| (31) <i>SYNORHOPALUM</i> , Ashmead. | (36) <i>PODAGRITUS</i> , Spinola. ? uncertain. |
| (1) <i>S. decorus</i> , Fox, ♀. | (1) <i>P. fulvohirtus</i> , Cam. |
| (32) <i>BRACHYMERUS</i> , Dahlbom. | (2) <i>P. maculitarsis</i> , Cam. |
| (33) <i>ALLIOGNATHUS</i> , Ashmead. | (3) <i>P. jason</i> , Cam. |
| (1) <i>A. occidentalis</i> , Fox, ♀ ♂. | (37) <i>RHOPALUM</i> , Kirby. |
| (34) <i>MICROCERABRO</i> , Saussure. | (1) <i>R. pedicellatum</i> , Pack., ♀ ♂. |
| (35) <i>MONIÆCERA</i> , Ashmead. | (2) <i>rufigaster</i> , Pack., ♀ ♂. |
| (1) <i>M. abdominalis</i> , Fox, ♀. | |

FAMILY XVII.—Pemphredonidæ.

The difference in venation of the hind wings and the distinctly petio-late abdomen, as well as the venation of the front wings, readily distinguish this family from the *Crabronidæ*. In the former family the median cell is fully twice as long as the submedian, while in the *Pemphredonidæ* it is not twice as long as the submedian cell.

Two subfamilies have been recognized, distinguished as follows :

Table of Subfamilies.

Antennæ inserted close to the base of the clypeus ; front wings with two cubital cells, rarely with one only . . Subfamily I., Pemphredoninæ.

Antennæ inserted far above the clypeus on or near the middle of the face ; front wings with three cubital cells . . . Subfamily II., Pseninæ.

SUBFAMILY I.—Pemphredoninæ.

The insertion of the antennæ far forward, close to the base of the clypeus, is the only reliable character to separate the subfamily from the Pseninæ, although, as a rule, the head is larger, more quadrate, and the venation of the front wings is also different.

The genera may be recognized by the use of the following table :

Table of Genera.

- | | |
|--|----------------------|
| Front wings with two recurrent nervures..... | 4. |
| Front wings with only one recurrent nervure. | |
| Front wings with two cubital cells..... | 2. |
| Front wings with only one cubital cell. | |
| Marginal cell short, triangular ; clypeus triangularly pointed anteriorly or with a slight median production ; mandibles bidentate, the lower tooth the longer. | Ammoplanus, Girard. |
| 2. Petiole of abdomen long..... | 3. |
| Petiole of abdomen short. | |
| Second cubital cell quadrate ; recurrent nervure interstitial with the first transverse cubitus or nearly ; mandibles bidentate..... | Spilomena, Shuckard. |
| 3. Recurrent nervure received by the first cubital cell near its middle or little beyond ; second cubital cell quadrate ; ventral plate in ♂ normal ; mandibles bidentate..... | Stigmus, Jurine. |
| Recurrent nervure received by the second cubital cell at its lower basal angle or interstitial with the first transverse cubitus ; | |

- second cubital cell triangular ; ventral plate in ♀ armed with a spine.....Harpactophilus, Smith.
4. Abdomen with the petiole never longer than the hind coxæ.....5.
 Abdomen with the petiole longer than the hind coxæ ; mandibles 3-dentate.
 First cubital cell receiving both recurrent nervures, or the second recurrent is interstitial with the first transverse cubitus..... Cemonus, Jurine.
 =Diplebus, Westw.
- First and second cubital cells each receiving a recurrent nervure ; second cubital cell large, usually quadrate.....Pemphredon, Shuckard.
5. Hind tibiæ along the outer face spinous or subserate.....6.
 Hind tibiæ along the outer face smooth, unarmed.
 Head armed with a spine or tubercle between the antennæ ; labrum not triangularly produced.....Ceratophorus, Shuckard.
 Head unarmed ; labrum triangularly produced..Passaloecus, Shuck.
6. Head seen from in front wider than long ; clypeus at apex emarginate ; abdomen ovate, not longer than the head and thorax united, the petiole very short.....Diodontus, Curtis.
 Head seen from in front elongate, longer than wide ; clypeus not emarginate ; abdomen elongate, slender, cylindrical, longer than the head and thorax united.....Polymistus, Saussure.

North American Species.

- | | |
|---|--------------------------------------|
| (1) AMMOPLÁNUS, Girard. | (4) <i>S. fulvipes</i> , Fox, ♀. |
| (1) <i>A. columbianus</i> , Kohl., ♀. | (5) <i>S. parallelus</i> , Say, ♀. |
| (2) <i>A. constrictus</i> , Prov. (Anacrabro), ♀. | (6) <i>S. podagritus</i> , Kohl, ♀. |
| (3) <i>A. laevis</i> , Prov. (Anacrabro), ♀. | (7) <i>S. montivagus</i> , Cam., ♀. |
| (2) SPILOMENA, Shuckard. | (4) HARPACTOPHILUS, Smith. |
| (1) <i>S. pusilla</i> , Say, ♀. | (5) CEMONUS, Jurine. |
| (2) <i>S. Foxii</i> , Ckll. | (1) <i>C. inornatus</i> , Say. |
| (3) STIGMUS, Jurine. | (2) <i>C. bipartior</i> , Fox, ♀. |
| (1) <i>S. americanus</i> , Pack., ♀ ♂. | (3) <i>C. tenax</i> , Fox, ♀ ♂. |
| (2) <i>S. inordinatus</i> , Fox, ♀ ♂. | (6) PEMPHREDON, Shuckard. |
| (3) <i>S. fraternus</i> , Say, ♀ ♂. | (1) <i>P. concolor</i> , Say, ♀ ♂. |
| | (2) <i>P. angularis</i> , Fox, ♀ ♂. |
| | (3) <i>P. nearticus</i> , Kohl, ♀ ♂. |

- | | |
|--|--|
| (4) <i>P. Rileyi</i> , Fox, ♀ ♂. | (5) <i>P. dispar</i> , Fox, ♂. |
| (5) <i>P. confertim</i> , Fox, ♂. | (6) <i>P. cuspidatus</i> , Smith, ♀. |
| (6) <i>P. Provancheri</i> , Ashm., ♀. | (7) <i>P. armeniaciae</i> , Ckll. and = concolor, Prov., nec. Fox. |
| Say. | (9) <i>DIODONTUS</i> , Curtis. |
| (7) <i>P. montanus</i> , Dahlb., ♀ ♂. | (1) <i>D. occidentalis</i> , Fox, ♀ ♂. |
| (8) <i>P. (?) marginatus</i> , Say. | (2) <i>D. rugosus</i> , Fox, ♂. |
| (7) <i>CERATOPHORUS</i> , Shuckard. | (3) <i>D. flavitarsis</i> , Fox, ♂. |
| (8) <i>PASSALOECCUS</i> , Shuckard. | (4) <i>D. americanus</i> , Pack., ♀ ♂. |
| (1) <i>P. annulatus</i> , Say, ♀ ♂. | (5) <i>D. Gillettei</i> , Fox, ♀. |
| (2) <i>P. relativus</i> , Fox, ♂. | (6) <i>D. luguminiferus</i> , Ckll, ♂. |
| (3) <i>P. distinctus</i> , Fox, ♂. | (7) <i>D. nigritus</i> , Fox, ♀. |
| (4) <i>P. mandibularis</i> , Cress, ♀ ♂. | (10) <i>POLYMYSTUS</i> , Saussure. |

SUBFAMILY II.—*Pseninæ*.

In this subfamily, the species, as a rule, are narrower and more elongate; the head less distinctly quadrate, more transverse, with narrower temples; the front wings with three cubital cells; while *the antennæ are always inserted on or near the middle of the face, far above the clypeus*.

Psen, Latreille, was the first genus to be described, but the description was a broad one, and included all the species known at that time. It was subsequently, however, subdivided by Shuckard and others, and in order to do justice to these authors, and to prevent the erection of new generic names, I prefer to follow them in preference to Kohl, who would restrict all to a single genus, with *Sphex atra*, Fabr. (Panzer), as the type.

This was also the *status* of the subgenera up to the appearance of Kohl's work in 1896, and was acceded to and accepted by all active Hymenopterologists, and I can see no good reason for making a change in our definition of these subgenera at this late date, and thus bring confusion into our nomenclature and text-books.

The genera recognized may be tabulated as follows:

Table of Genera.

Cubitus in hind wings originating *beyond* the transverse median nerve, the latter short and straight, perpendicular.....2.

Cubitus in hind wings originating *before* the transverse median nerve, the latter long and oblique or slightly bent, but *not* perpendicular.

Second cubital cell receiving both recurrent nervures, *rarely* with the first recurrent nervure interstitial with the first transverse

cubitus, or the second recurrent interstitial with the second transverse cubitus; inner spur of hind tibiæ dilated; metathorax with a median sulcus, the area at base striate or alveolate; petiole of abdomen long, usually furrowed laterally; clypeus convex or subconvex, separated, anteriorly more or less rounded, and with a slight vein, but without a median sinus; labrum hidden..... Mimesa, Shuckard.

=Aporia, Wesm.

[Type *M. equestris*, Lind.]

Second and third cubital cells each receiving a recurrent nervure, or the first recurrent nervure is interstitial with the first transverse cubitus; head with a spine between the antennæ; clypeus anteriorly rimmed, and with a median

sinus..... Dahlbomia, Wissmann.

=Mesopora, Wesmael.

=Psen, Kohl.

[Type *Sphex atra*, Panz.]

2. Submedian cell in front wings a little shorter than the median, the transverse median nervure being not quite interstitial with the basal nervure; second cubital cell usually much narrower above.

Second and third cubital cells each receiving a recurrent nervure, rarely with the first recurrent nervure interstitial with the first transverse cubitus..... Psen, Latreille.

=Psenulus, Kohl pars.

[Type *P. atratus*, Panz.]

Second cubital cell receiving both recurrent nerv-

ures..... Psenulus, Kohl.

[Type *M. fuscipennis*, Dahlb.]

North American Species.

(11) MIMESA, Shuckard.

(1) *M. chalcifrons*, Pack., ♀.

(2) *M. argentifrons*, Cross., ♀ ♂.

(3) *M. Cressonii*, Pack., ♀ ♂.

(4) *M. borealis*, Smith, ♀ ♂.

(5) *M. clypeata*, Fox, ♀ ♂.

(6) *M. pauper*, Pack., ♀ ♂.

(7) *M. uncinata*, Cress., ♀ ♂.

(8) *M. proxima*, Cress., ♀.

(9) *M. basirufa*, Pack., ♀ ♂.

(10) *M. cylindricus*, Fox., ♀ ♂.

(11) *M. regularis*, Fox, ♀.

(12) *M. niger*, Pack., ♀ ♂.

(13) *M. mixta*, Fox, ♀ ♂.

(14) *M. leucopus*, Pack., ♀ ♂.

(15) *M. cingulata*, Pack. ♂.

(16) *M. granulosus*, Fox., ♂.

(17) *M. gregaria*, Fox, ♂.

- | | |
|--|--|
| (18) <i>M. maculipes</i> , Fox, ♂. | (12) DAHLBOMIA, Wissman. |
| (19) <i>M. longicornis</i> , Fox, ♂. | (13) PSEN, Latreille. |
| (20) <i>M. mellipes</i> , Say, ♀ ♂. | (1) <i>P. frontalis</i> , Fox, ♀. |
| (21) <i>M. monticola</i> , Pack., ♀ ♂. | (2) <i>P. trisulcus</i> , Fox, ♀. |
| (22) <i>M. Mexicana</i> , Cam., ♀. | (3) <i>P. kohlia</i> , Fox, ♀ ♂. |
| (23) <i>M. pulchra</i> , Cam., ♀. | (4) <i>P. punctatus</i> , Fox, ♀. |
| (24) <i>M. striolata</i> , Cam., ♀. | (5) <i>P. simplicicornis</i> , Fox, ♂. |
| (25) <i>M. longiventris</i> , Cam., ♀. | (6) <i>P. fuscipes</i> , Pack. |
| (26) <i>M. Cameroni</i> , Ashm., ♀. | (7) <i>P. tibialis</i> , Cr., ♀ ♂. |
| = <i>monticola</i> , Cam., nec., Pack. | (8) <i>P. suffusus</i> , Fox, ♀. |
| (27) <i>M. Montezuma</i> , Cam., ♀. | (9) <i>P. annulipes</i> , Cam. |
| (28) <i>M. claviventris</i> , Cam., ♀. | (14) PSENULUS, Kohl. |

CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.—III.

BY GEO. B. KING, LAWRENCE, MASS.

Diaspina.

- (46) *Aspidiotus hederæ*, Vall.; 1829-1897. I.

This is a very common pest in all greenhouses at Lawrence, and no doubt in all greenhouses in the State. It is found at Lawrence on Ivy, Palms and Cycas. A variety determined by Prof. Cockerell as probably *ericæ*, Boisd., on heather (*Erica*) in a greenhouse at Lawrence. The scale is longer than typical *hederæ*, and of a yellowish cast, and also covered more or less with the epidermis of the plant. *Hederæ* has been recorded from Kansas, Utah, Illinois, California, Florida, Colorado, New Mexico, and New York, on Ivy, China-tree, Lemon, Oleander, Orange, Lace-fern = *Asparagus plumosa*, Acacia, Maple, Yucca, Plum, Cherry, Currant, Melia, Grass and Clover.

- (47) *Aspidiotus aurantii*, Mask.; 1878-1897. I.

Very common species on orange and lemon exposed for sale in fruit stores. Some of the fruit was completely covered with the scales and unfit for sale. They came from California and Florida. It is recorded from Arizona, California, and Illinois, on orange, lemon, grape, and rose.

- (48) *Aspidiotus perniciosus*, Comst.; 1881-1895. N.

Recorded from 19 localities in this State, on apple, pear, peach, and rose. It has been reported from Alabama, Arizona, Colorado, California, North Carolina, Connecticut, Delaware, Florida, Georgia, Illinois, Idaho,

Indiana, New Jersey, Kansas, Kentucky, Louisiana, Missouri, Michigan, New Mexico, New York, Nevada, Oregon, Oklahoma, Ohio, Pennsylvania, Washington St., Virginia, West Virginia, and Vermont, on apple, peach, plum, prune, pear, quince, rose, grape, spiræa, apricot, currant, elm, walnut, corn, sugar-cane, etc. Mr. Schwarz has found the young of *pernicius* in an ants' nest, *Monomorium minutum*, Mayr., in Virginia.

(49) *Aspidiotus ancylus*, Putn.; 1877-1898. N.

Injurious in a few instances, at Malden, Charles Bank Park, Everett, and Lawrence, Mass., on Apple, Honey Locust, and *Spiræa aruncus*. Recorded from Colorado, Illinois, Iowa, Kansas, Maryland, Minnesota, New York, New Mexico, Ohio, Virginia, Washington, D. C., and Washington St., on Fay currant, quince, Wrightii apple, English oak, pear, osage orange, peach, water-locust, maple, linden, hackberry, black nut, beech, and ash.

(50) *Aspidiotus ficus*, Ashm.; 1888-1897. I.

Frequently found in greenhouses at Lawrence, Mass., on orange, rubber plant, palms, and on orange, lemon, and banana in fruit stores. Recorded from Texas, Florida, New Mexico, Louisiana, Georgia, Ohio, and Colorado, on orange, lemon, Ficus, sp. *Laurus virginiana*, cocoanut palm, *Oreodoxa regia*, *Curcuma longa*, *Pandanus*, *Calogyne cristata*, *gambolana*, *Myrtus Hillii*, camphor, and rose.

(51) *Aspidiotus articulatus*, Morg.; 1889-1898. I.

Found on limes in a fruit store at Lawrence, probably from Jamaica. It is known from West Africa, Demerara, Trinidad, Jamaica, and Nevis. It is not known to inhabit any portion of the United States.

(52) *Aspidiotus Forbesi*, Johnson; 1896-1898. N.

At Reading and Shady Hill, Mass., on *Acer pseudoplatanus* and apple; coll. Mr. Kirkland. It is found at New Mexico, Kansas, Illinois, Maryland, Georgia, and West Virginia, on apple and cherry.

(53) *Aspidiotus Fernaldi*, Ckll.; 1898-1898. N.

Found at Charles Bank Park on *Gleditschia triacanthos*, by Messrs. Kirkland and Cooley.

(54) *Aspidiotus smilacis*, Comst.; 1883-1898. N.

On Smilax, at Woods' Holl, Mass.; found by Prof. Trelease (Comstock, Cornell Rept., 1883).

- (55) *Aspidiotus* sp. (prob. young of *A. dictyospermi*, Morg.); 1889-1898. I.

Found by Mr. J. W. Folsom at the Botanic Gardens, Cambridge, Mass. (Ckll. in litt.). It is recorded from Colorado, found in a greenhouse on *Champæropsis elegans*.

- (56) *Aspidiotus Crawii*, Ckll.; 1897-1899. I.

On ivy, *Hedera*, in a greenhouse at Lawrence, Mass., only known hitherto from Mexico, found there by Prof. C. H. T. Townsend, on fruit of some palm.

- (57) *Aspidiotus cyanophylli*, Sign.; 1869-1899. I.

In a greenhouse at Lawrence, Mass., on a plant called *Cobo japonica*, on *Ficus*, M. S. (Comstock, Cornell Rpt., 1883, p. 39), on *Cyanophyllum*, at Paris, in a greenhouse (Signoret) on palm and *Cycas* in Ceylon according to Green. Also in Mexico.

- (58) *Diaspis carueli*, Targ.; 1868-1895. I.

Mr. J. G. Jack found this species at Jamaica Plain, Mass., on *Juniperus sphaerica*. It has been found at Washington, D. C., on various species of *Juniperus*.

- (59) *Diaspis amygdali*, Tryon; 1889-1898. I.

At Jamaica Plain on *Prunus mume* and *P. subhirtella*; also at Charles Bank Park, Boston, on *Gleditschia triacanthos*, by Mr. Kirkland. It is said to occur at Ohio on Japan flowering cherry. As *lanatus* it is reported from Washington, D. C., Georgia, Florida, and California.

- (60) *Aulacaspis rosæ*, Bouché; 1833-1898. I. Syn. *Diaspis rosæ*, Bouché.

A common pest on *Rubus canadensis*, *R. strigosus*, *R. occidentalis*, and a number of species of rose bushes, also wild rose bush at Lawrence, Methuen and Andover, Mass.; recorded from New Jersey, Pennsylvania, Ohio, Missouri, Illinois, Delaware, California, and Arizona, on rose, raspberry and blackberry. A *Chiloneurus*, n. sp., has been reared from scales found at Andover, Mass., 1898.

- (61) *Aulacaspis bromeliæ*, Kerner; 1788-1862. I.

At Plum Island, Amherst and Cambridge, Mass., on *Acacia*, *Olea fragrans*, *Guidia? simplex* and ivy. In greenhouses at Amherst and Cambridge, also in the Botanic Gardens at Cambridge. It is recorded from California on pineapple in a greenhouse.

- (62) *Aulacaspis Boisduvalii*, Sign ; 1869-1897. I.

On palms in greenhouses at Lawrence, Mass.; also at Denver Colorado, on palms in greenhouse.

- (63) *Aulacaspis elegans*, Leon ; 1899. I. Syn. *Howardia elegans*.

On *Cycas revoluta* in a greenhouse at Lawrence, Mass. The plant was imported from Bermuda last year. The species was only known from Portici, Italy, on *Cycas revoluta*.

- (64) *Parlatoria proteus*, Curt., var. *Pergandei*, Comst.; 1881-1897. I.

Very common on oranges and lemons at Lawrence, Mass., in markets. It is recorded from Florida on orange and lemon; at California on imported date palm.

- (65) *Parlatoria zizyphus*, Lucas ; 1853-1897. I.

On lemons exposed for sale in fruit stores. I have no record of its being found infesting any trees in the United States. It is recorded from Africa.

- (66) *Parlatoria* (prob. *proteus*, var. *crotonis*), Ckll.; 1895-1898. I.

Found at the Cambridge Botanic Gardens by Mr. J. W. Folsom (Ckll. in litt.).

- (67) *Mytilaspis pomorum*, Bouché ; 1851-1862. I.

One of the most common coccid pests at Lawrence, Methuen, Andover and Springfield, Mass., and no doubt in every town in the State, on willow, poplar, lilac, *Viburnum*, *Spiraea aruncus*, rose, apple, and *Cornus alternifolia*. It is recorded from Alabama, Connecticut, California, South Carolina, Delaware, Georgia, New Hampshire, Illinois, Idaho, Indiana, Rhode Island, New Jersey, Kansas, Maryland, Michigan, Maine, Missouri, New York, Nevada, Nebraska, Ohio, Pennsylvania, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, Washington St., and Washington, D. C., on apple, pear, quince, raspberry, currant, hawthorn, buckthorn, linden, hop-tree, bladder-nut, horse-chestnut, maple, water-locust, honeysuckle, ash, elm, hackberry, cottonwood, willow, poplar, prune, birch, *Cornus* sp. and *Cornus californicus*, plum, wild red cherry, wild grape, *spiraea*, fig, and rose bushes. The parasite, *Aphelinus mytilaspidis*, Le B., was reared from scales at Methuen, Mass.

- (68) *Mytilaspis citricola*, Pack.; 1870-1897. N.

On orange and lemon, in fruit stores, exposed for sale at Lawrence,

Mass. It is known from California, Colorado, Florida, and Georgia, on orange and lemon.

(69) *Mytilaspis Gloverii*, Pack.; 1869-1897. N.

At Lawrence, Mass., on orange and lemon in fruit stores, and recorded from California, Louisiana, Florida, Georgia, and New York, on orange and lemon.

(70) *Pinnaspis pandani*, Comst.; 1881-1880. I.

At Cambridge Botanic Gardens, coll. by J. W. Folsom, 1898 (Ckll. in litt.). Originally described from Harvard Botanic Garden under the genus *Mytilaspis*.

CORRESPONDENCE.

A CALIFORNIAN TICK.

SIR,—Herewith I send a specimen of an *Arachnide* which looks to me to belong to the genus *Argas*, or so it was called when I was studying that group of *Arthrozoa*.

At the same time, I send you an account of observations upon the effect of the bite of the *Argas*, which observations seem to me to throw some light on the conflicting statements regarding the effect of the bite of the reputed *Argas Persicus*.

From the observations of my correspondent, Mr. R. A. Plaskett, who resides in a district in the Santa Lucia Mountains infested by this very local *Arachnide*, it appears that horses, which animals are generally bitten just above the hoof, seem not to suffer. The *Argas* drinks only from three to five minutes and then drops without leaving a swelling. This is unlike the *Ixodes* and *Trombidium*, which will suck for a day or two, frequently causing swelling and suppuration. These are generally reputed to be the result of methods used in extracting the animal, but they are occasionally observed where the animal has left of its own free will after having satisfied its appetite.

Another peculiar characteristic in the habits of the animal is its dislike of green vegetation. It is always found on the top of dry, leafless twigs or in dust, never amidst foliage, as are *Trombidium* and *Ixodes*; but this part of my friend's observations has to be taken *cum grano salis*, as he is not an experienced entomologist, and amidst green foliage it is

not so easy to discover a dust-coloured insect as when it is isolated on the top of a dry twig, whence it lets itself drop upon the passer-by.

As to the effect of the *Argas* bite on the human species, the symptoms vary as well as the time of suction following the bite. The effect seems to depend chiefly on personal idiosyncrasy, which probably also accounts for the comparative immunities and receptivities reported in reference to the bite of *Acanthia* (*Cimex*) *lectularia*, *Reduvius*, and of the different *Tipulides* and *Culicides*. R. A. Plaskett has been bitten twice, and in each case it took about twenty-four hours before fever and swelling set in. The numbness of the bitten parts, which is so characteristic of the bite of *Arachnides*, *Myriopodes*, and of some Hymenopterous stings, was not noticed in a single instance. Now, these observations agree very well with the statements that are in our possession regarding the effects of the bites of other *Argas*, and at the same time they explain the discrepancies in the statements of the effects of the bite of the dreaded *Argas Persicus*, which seems to be as local as our California insect.

The fatal termination in cases where persons have been bitten by *Argas Persicus*, which are mentioned by old Herodotus, and by Pallas in modern times, may have their origin in malarious fevers, which are very common in that district of the Persian Province Ghilan, between the Caspian Sea and the Elbrus Mountains, where the *Argas* is found. The bite of the animal is probably only a coincidence, of course not favourable to the condition of a patient already weakened by malaria. Here in California we have had to face an analogous error with regard to the fatal effects of *Rhus diversiloba*. All the fatal cases were malaria patients, sick for a considerable time before they came in contact with the *Rhus*.

As to the effect of the bite of *Argas Persicus*, even if not fatal, the consequences in some instances must be serious enough to induce the inhabitants of Persian villages to change the location of their settlement, as is mentioned in Kotzebue's report of his travels through Ghilan. At the same time, this change of location as a remedy is another proof of the very local distribution of *Argas Persicus*, a peculiarity shared in common with *Argas Columbæ* of Europe and our own Santa Lucia species.

Our Santa Lucia species seems to be both diurnal and nocturnal. The *Argas Columbæ* of Europe is nocturnal, and in its habits bears a

close resemblance to the common bedbug. The local name of our Californian species is Pajaronela, a word evidently derived from the Spanish Pajaro, a bird, and it would indicate to me a similar manner of living to that of *Argas Columbae*, were not the statements of Mr. Plaskett, which are founded on repeated observations of this locally very common insect, diametrically opposed to such a supposition.

I hope that the publication of these statements will excite some interest amongst practical students of entomology, and that they may lead to a closer study of those insects which interfere with the well-being of our own race.

It may be that a closer study of the facts will furnish us with data that will explain why the sting of an insect, in some instances producing serious consequences, is in others perfectly harmless. Such data might throw some light on the mysterious play of idiosyncrasies.

H. H. BEHR.

The specimen sent by Dr. Behr has been submitted for identification to the United States Entomologist, Dr. Howard, from whose Division the following reply has been received :

"In the absence of Dr. Howard, I have to reply to your letter of the 3rd instant, transmitting a copy of an article by Dr. H. H. Behr, and a specimen of tick for identification. Mr. Banks, our authority on ticks, has examined the specimen in question, and is responsible for the following identification and note :

"The tick is *Ornithodoros Americanus*, Marx, and probably the same as *O. turicata*, Megnin, from Mexico. Neumann, in his recent revision of the group, uses Megnin's name. It is well known to attack various animals. It is not common in the Southwest. There are four species of Argasids in our country : *Argas Americanus*, Pack.; *A. Sanchezi*, Dugès ; *Ornithodoros Americanus*, Marx, and *O. Megnini*, Dugès. Another species, *A. talajae*, Guérin, may also occur in the region near Mexico."

"The specimen and manuscript are returned herewith.

"C. L. MARLATT,

"Acting Entomologist."

LUCANUS MASAMA, LEC.

SIR,—I found this evening (28th June, 1899,) a male specimen of *Lucanus Masama* (Lec.), on the ground at the foot of a dead cotton tree. Investigating the place, I noticed several large holes around the tree, and discovered in one of them a pair of beetles, which were evidently intending to mate. At the foot of another cotton tree stump near by, a male was crawling slowly on the ground; another male came flying and alighted, and a short search was rewarded by the discovery of a female, hidden in a hole. Another dead cotton tree yielded three males (two of them crawling and one flying) and one female, at the foot of the tree on the ground.

It seems that the metamorphosis of the larva to the adult *Lucanus masama* takes place underground, the female probably not leaving the ground; whereas the males fly around in search of the opposite sex. I noticed some large holes in the trees under which the specimens were found, and if these holes were made by the larva of *L. masama*, then the above ventured hypothesis is wrong, and the females simply hide in the ground, after having completed their metamorphosis in the substance of the tree, and seek the ground possibly for the deposition of their eggs.

I would be greatly obliged to any reader of this notice for the life history of the other N. American species of *Lucanus*.

A. FENYES, M. D.,
Santa Fè, New Mexico.

ACKNOWLEDGMENT.

SIR,—I desire, on behalf of the Entomological Society of Ontario, to make public acknowledgment of its indebtedness to Mr. C. T. Ramsden, of Santiago de Cuba, for many curious and interesting entomological specimens of various kinds, his own collecting in that now famed locality. A more extended notice may be taken of some of them at a future time.

J. ALSTON MOFFAT, Curator.

The Rev. C. J. S. Bethune, editor of this magazine, begs to announce that he has resigned his position as Head Master of Trinity College School, Port Hope, which he has held for the last twenty-nine years, and that his address, after August 24th, will be 500 Dufferin Avenue, London, Ontario.

Mailed August 11th, 1899.

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OPHIOGOMPHUS.

BY JAMES G. NEEDHAM, LAKE FOREST, ILL.

This genus of dragon flies is one of the groups whose members are accounted rare in collections, though quite abundant in nature. With the exception of three species, two of which have only been obtained in numbers by breeding, few imagoes have been taken. Although I have collected carefully for several years in localities where a few species were common enough, I have seen but three imagoes at large, but I have bred one species by hundreds, and have seen the exuviae upon the banks of streams by tens of thousands.

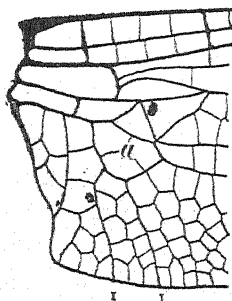
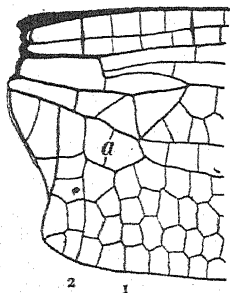
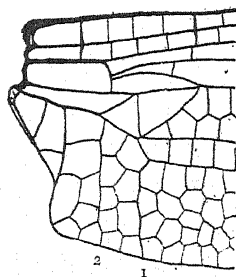
Nymphs of this genus seem to prefer the sandy or gravelly beds of clear, rapid streams, flowing through rocky woods. What becomes of the countless imagoes which issue from such places by night in early summer I have not as yet been able to find out.

So long as the collector of these insects depends entirely upon an air net for his imagoes they are likely to remain rare in his collection; but even a single occasional capture of a good specimen may still add to our knowledge of the genus, since variation is considerable, descriptions are fragmentary, and specimens of most species are few.

This paper is but an excuse for the accompanying plate (5), whose figures are mainly drawn from the types of species and show the structures chiefly used in characterizing them. In its preparation I have had free use of the Hagen collection at Cambridge and of the Lintner collection at Albany—thanks to the kindness of Mr. Henshaw and of Dr. Felt, respectively. This plate and the few annotations on species which follow will serve to bring our species together in one view, and will also indicate the chief gaps in our knowledge of them.

Secondary sexual characters have been mainly used for separating *Ophiogomphus* from its nearest allies, *Onychogomphus* (fig. 32) of the Old World, and *Herpetogomphus* of the western United States and southward. The most salient of the differential characters used for the two American genera have been the form of the inferior abdominal appendage

in the male, and the length of the vulvar lamina in the female. These have proved unsatisfactory, especially for the males (of which more are known), yet without destroying faith in the validity of the two genera as natural groups. I wish to point out that there is a venational character, applicable to both sexes, which seems to segregate these two genera sharply. It is the anal loop (see figs. 31 and 33). In *Ophiogomphus* (fig. 31) the first and second branches of the anal vein (1 and 2) are approximated near their origin to enclose, together with a cross vein connecting them, a distinct anal loop (*a*) of two to four (normally of

FIG. 31.—*OPHIOGOMPHUS*.FIG. 32.—*ONYCHOGOMPHUS*.FIG. 33.—*HERPETOGOMPHUS*.

three) cells. In *Herpetogomphus* (fig. 33) these veins are not so approximated, and no such semicircular enclosure is formed, but two ordinary cells lie between the veins at their origin.

The genus *Ophiogomphus* includes, besides four European and Asiatic species, the following thirteen nominal species found in the United States, named in the order of their discovery :

1. *O. colubrinus*, Selys.—Maine and northward. ♂ and ♀ known.
2. *O. rupinsulensis*, Walsh.—Eastern U. S. ♂ and ♀ known.
3. *O. Mainensis*, Packard.—Northeastern U. S. ♂? and ♀ known.
4. *O. bison*, Selys.—Nevada. ♀ known.
5. *O. severus*, Hagen.—Colo. ♂ and ♀ known.
6. *O. montanus*, Selys.—Mont. ♂ known.
7. *O. Morrisoni*, Selys.—Nev. ♂ and ♀ known.
8. *O. occidentis*, Hagen.*—Wash. ♂ and ♀ known.
9. *O. Carolinus*, Hagen.*—N. Car., Ky.? ♂ and ♀ known.
10. *O. aspersus*, Morse.—♂ and ♀ known.

*Imago undescribed.

11. *O. Johannus*, Needham.—N. Y. ♂ known.
12. *O. Carolus*, Needham.—N. Y. ♂ and ♀ known.
13. *O. anomalus*, Harvey.—Maine. ♂ known.

STRAY NOTES ON SOME OF THE SPECIES.

O. anomalus, Harvey (Ent. News, IX., 6c. ♂. Pl. V., fig. 1.), is like *Herpetogomphus* in the form of the terminal abdominal appendages of the male. I have before me the hind wing of the type (which Professor Harvey has kindly sent me), and the anal loop is of the typical semicircular three-celled form of *Ophiogomphus*.

O. Colubrinus, Selys, is the most sharply marked species of the genus. It is like the preceding in the generally darker coloration of the body and in having the face transversely lineate with black, but it is unlike all the others in extreme length of the inferior abdominal appendage in the male, and in the straightness of the lobes of the vulvar lamina in the female (Pl. 5, figs. 7 and 34).

O. Johannus, Ndhm., and *O. Carolinus*, Hag., are distinguished by a second bifurcation of the inferior abdominal appendage in the male. The figures of *O. Johannus*, drawn from the type, which was a somewhat imperfect specimen and apparently not quite mature, may not fully represent the species; but the tips of the appendages and the genital hamules were at least well developed (figs. 9, 18 and 27 of Plate 5). The thicker parts of appendages are subject to some distortion in drying in immature specimens. As to *O. Carolinus*, Hag., the types are in the Hagen collection at Cambridge, undescribed; but a female nymph skin from Bee Spring, Ky., Hagen has described and referred by supposition to this species (Trans. Amer. Ent. Soc., XII., 258, 1885). This is especially unfortunate, because the nymphs in this genus are well-nigh undeterminable. If now the Kentucky nymphs should yield another species of imago—a thing entirely possible—there would be synonymic confusion of a rather unique sort. With small likelihood of settling the question of the correctness of Hagen's supposition as to the nymph, it would seem best to regard the name as rightfully belonging to the imagoes from N. Carolina to which it was originally applied, and the types fixed by the figures herewith presented (figs. 8, 17, 26 and 35 of Plate 5).

O. Mainensis, Pack. (Proc. Ac. Nat. Sci., Phila., 1863, p. 255), and *O. Carolus*, Ndhm. (CAN. ENT., XXIX, 183, 1897), are very closely allied, perhaps identical. If the males in the Hagen collection were the types I should unhesitatingly pronounce *O. Carolus* a synonym. But the

original female type there preserved is very different from any females of *O. Carolus* I have seen, especially in the form of the occiput (see Plate 5, figs. 10 and 19). The occiput is variable, to be sure, but I have shown the full extent of variability exhibited by a very large series of females of *O. Carolus* in these pages (CAN. ENT., XXIX, Pl. 7, figs. 1-4), and have found nothing approximating the conformation of the type *O. Mainensis*. Since it is possible that the males associated with this female type may not belong with it, one must show before uniting the species either that the normal variation of the occiput includes such forms, or else that the female type is a freak. The specimens in the Lintner collection, determined by Hagen as *O. Mainensis*, agree entirely (both males and females) with *O. Carolus*.

Of the three closely allied far-western species, *O. severus*, Hag., *O. montanus*, Sel., and *O. Morrisoni*, Sel., I have seen very few specimens: of *montanus*, none at all. *Montanus* was first described as a variety of *O. severus*, but was ranked as a species by De Selys in his Revision des Ophiogomphus (C. R. Ento. Soc. Belg., 1879, p. lxiv.), and so listed by Kirby in his Catalogue of the Odonata. These three species constitute a group within the genus characterized by De Selys by the simple (hornless) occiput of the female—a thing not distinctive, as we have seen, but apparently entirely characteristic of these species.

The remaining species constitute a troublesome lot, among which *O. aspersus*, Morse, seems pretty sharply defined; but variation in the form of the accessory genitalia is very considerable. Only two of the species, *O. rupinsulensis* and *O. occidentis*, are known from more than a few specimens. The figures herewith given for these two species seem distinct enough, yet the specimens in the Hagen collection show them to intergrade almost completely. *O. bison* was dropped by De Selys from the list given in his Revision (*op. cit.*)—whether intentionally or not, I do not know—but the female in the Hagen collection is certainly very much like *O. rupinsulensis*. (See Plate 5, fig. 32.) I desire at this point to correct a very serious error of my own: Misled by the upturned inferior appendages of the male, and having too great faith in the constancy of genital characters, I described as *Herpetogomphus pictus* (CAN. ENT., XXIX., 181, 1897), some exceptionally finely coloured males of *O. rupinsulensis*. Since studying a large series, I do not retain the name even for a reliable variety.

I figure here for *O. occidentis* (Pl. 5, figs. 4, 13 and 22), the bred specimen in the Hagen collection, which must be considered the type, since its cast skin is described (Trans. Amer. Ent. Soc., XII., 259).

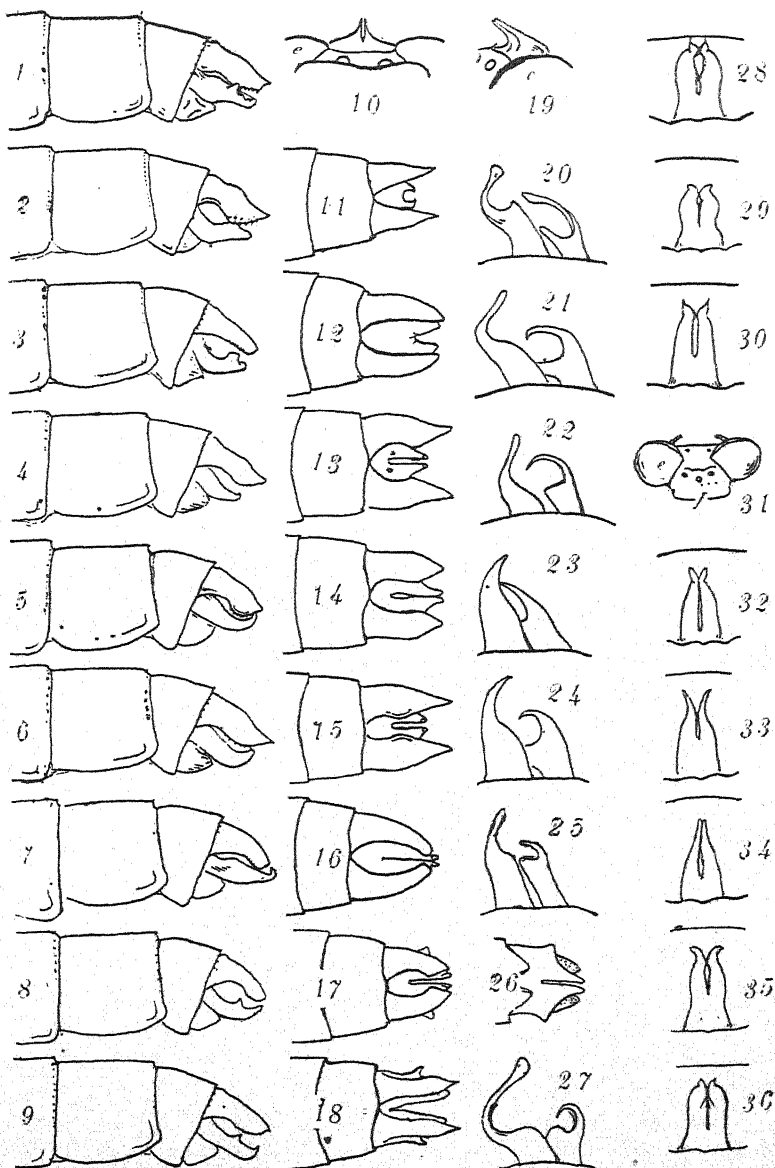


PLATE 5.—STRUCTURAL DETAILS OF OPHIOGOMPHUS.

OPHIGOMPHUS.

Explanations of Plate 5.

Figs. 1 and 28—*O. Carolus*, Ndhm.

Figs. 10, 19 and 36—*O. Mainensis*, Pack.

Figs. 2, 11, 20 and 29—*O. aspersus*, Morse.

Figs. 3, 12, 21, 30 and 31—*O. rupinsulensis*, Walsh.

Figs. 4, 13 and 22—*O. occidentis*, Hag.

Figs. 5, 14 and 23—*O. Morrisoni*, Sel.

Fig. 32—*O. bison*, Sel.

Figs. 6, 15, 24 and 33—*O. severus*, Hag.

Figs. 7, 16, 25 and 34—*O. colubrinus*, Sel.

Figs. 8, 17, 26 and 35—*O. Carolinus*, Hag.

Figs. 9, 18 and 27—*O. Johannus*, Ndhm.

The figures in the first column represent lateral views of the terminal abdominal appendages of the males; those in the second column, dorsal views of the same; those in the third column, the genital hamules of the males, inverted and viewed from the side; those in the fourth column, vulvar lamina of females upon the sternum of the 9th abdominal segment:—*excepting* figs. 10, front, and 19, oblique fronto-lateral views of the occipital process of the female type of *O. Mainensis*; fig. 26, ventral view of male abdominal appendages; and fig. 31, dorsal view of the head of *O. rupinsulensis*, showing the curious post-ocular tubercles: *♂*, eye; *f*, frons.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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(Paper No. 4.)

FAMILY XVIII.—Bembicidæ.

The sessile abdomen, always without a constriction between the first and second segments, but above all the very large, free, triangularly elongated labrum, which is always much longer than wide at base, the sinuate or 2-shaped transverse median nervure in the hind wings, and the aborted ocelli, at once distinguished the family.

Most authorities have confused, or at least included this family with the family Stizidæ, which also has a more or less prominent labrum; but in the Stizidæ the ocelli are *always* distinct, normal, the labrum is most

frequently semicircular, always wider than long, while the middle tibiae have *two* distinct apical spurs, characters of great taxonomic value, readily recognizable, and which at once separate them from the Bembicidæ.

The genera are not numerous, and may be separated as follows:

Table of Genera.

Anterior ocellar cicatrice elliptic, round or reniform.....2.

Anterior ocellar cicatrice linear, transversely arcuate.

Metathorax excavated posteriorly, compressed laterally; last ventral segment in ♂ ending in 3 spines; mandibles dentate; maxillary palpi 6-, labial palpi 4-jointed.....Bembidula, Burm.

Metathorax flat or convex posteriorly, not compressed laterally; last ventral segment in ♂ ending in a single spine.

Mandibles dentate; maxillary palpi 4-, labial palpi 2-jointed.....Bembex, Fabr.

Mandibles edentate; maxillary palpi 3-, labial palpi 1-jointed.....Microbembex, Patton.

2. Front ocellar cicatrice round or reniform; maxilla short; maxillary palpi 6-, labial palpi 4-jointed.....Monedula, Latr.

Front ocellar cicatrice elliptic; maxilla long, attaining the hind coxæ;

• maxillary palpi 3-, labial palpi 1-jointed.....Steniola, Say.

North American Species.

(1) BEMBIDULA, Burmeister.

(1) *B. variegata*, Olis.

(2) *B. quadrifasciata*, Say.

(3) *B. insidiatrix*, Hdl.

(4) *B. parata*, Prov.

(5) *B. capnoptera*, Hdl.

var. *mesillensis*, Ckll.

(6) *B. fodiens*, Hdl.

(7) *B. diodonta*, Handl.

(8) *B. decisa*, Taschaub.

(9) *B. viduata*, Handl.

(10) *B. Burmeisteri*, Handl.

(2) BEMBEX, Fabricius.

(1) *B. amoena*, Hdl.

(2) *B. Belfragei*, Cr.

=(Cressoni, Hdl.)

(3) *B. insignis*, Hdl.

=*Belfragei*, Cr., pars.

(4) *B. spinolæ*, Lepel.

(=*fasciatus*, Auct.)

(5) *B. similans*, Fox.

(6) *B. Sayi*, Cr.

(7) *B. texana*, Cr.

(8) *B. troglodytes*, Hdl.

(9) *B. convexus*, Fox.

(10) *B. cinerea*, Hdl.

(11) *B. nubilipennis*, Cr.

(12) *B. pruinosa*, Fox.

(13) *B. occidentalis*, Fox.

(14) *B. u-scripta*, Fox.

(15) *B. multipicta*, Smith.

(16) *B. pallidipicta*, Smith.

- | | |
|---|---|
| (17) <i>B. mimas</i> , Handl. <i>MIOBOMBEX</i> , Patton. | (14) <i>M. villosa</i> , Fox. = <i>mamillata</i> , Fox nec Hedl. |
| (1) <i>M. monodonta</i> , Say. | (15) <i>M. usetata</i> , Fox. |
| (3) <i>MONEDULA</i> , Latreille. | (16) <i>M. pulla</i> , Hdl. |
| (1) <i>M. signata</i> , Linn, ♀ ♂. | (17) <i>M. nigrifrons</i> , Prov. |
| (2) <i>M. carolin</i> , Fabr., ♀ ♂. | (18) <i>M. heros</i> , Fabr., ♀ ♂. |
| (3) <i>M. spinosa</i> , Cr. = <i>formosa</i> , Cr. | (19) <i>M. surinamensis</i> , De Geer, ♀. |
| (4) <i>M. serrata</i> , Hdl. | (20) <i>M. maculata</i> , Fabr., ♀ ♂. |
| (5) <i>M. pulchella</i> , Hdl. = <i>minatula</i> , Hdl. | (21) <i>M. punctata</i> , Fabr., ♀ ♂. |
| (6) <i>M. tuberculata</i> , Fox. | (22) <i>M. dives</i> , Handl. |
| (7) <i>M. plana</i> , Fox. | (23) <i>M. mexicana</i> , Handl. |
| (8) <i>M. emarginata</i> , Cr. | (4) <i>STENIOLIA</i> , Say. |
| (9) <i>M. femorata</i> , Fox. | (1) <i>S. duplicata</i> , Say. = <i>scolopacea</i> , Handl. |
| (10) <i>M. pictifrons</i> , Smith. | (2) <i>S. obliqua</i> , Cr. |
| (11) <i>M. tenuicornis</i> , Fox. | (3) <i>S. tibialis</i> , Hdl. |
| (12) <i>M. scitula</i> , Fox. | (4) <i>S. longirostra</i> , Say. |
| (13) <i>M. exiqua</i> , Fox. | |

FAMILY XIX.—Larridæ.

This family seems to be closely allied to the family *Bembicidæ*, but is readily separated from it by the *small*, not free, labrum, which is usually completely hidden under the clypeus; the ocelli are distinct or, at most, with only the hind ocelli aborted or represented by cicatrices; the front wings have always a distinct stigma, while the cubitus in the hind wings originates most frequently beyond the transverse median nervure, the latter being straight, or at least never 2-shaped.

The family is a most extensive one, and widely distributed into all quarters of the globe, the temperate regions being especially rich in genera and species.

Four distinct groups have been recognized, which I designate as subfamilies, distinguishable as follows:

Table of Subfamilies.

- Hind ocelli normal, distinct.....2.
 Hind ocelli more or less distorted, obsolete or subobsolete, or indicated by cicatrices; mandibles most frequently emarginate on under side.....Subfamily I., *Larrinæ*.

2. Second cubital cell never petiolate, receiving both recurrent nervures, or the first and second submarginal cells each receive a recurrent nervure; pronotum long. Subfamily II., *Lyrodinæ*.
Second cubital cell petiolate or triangular, or more rarely entirely wanting; pronotum most frequently short, transverse.
Front wings with one or two cubital cells, or with none; pygidial area wanting. Subfamily III., *Nitelinæ*.
Front wings with two or three cubital cells; pygidial area present; marginal cell most frequently, but not always, truncate, with an appendage. Subfamily IV., *Pisoninæ*.

SUBFAMILY I.—*Larrinæ*.

The aborted hind ocelli, represented at the most by cicatrices, readily separate this subfamily from the others.

The table of genera, which follows, is almost a literal translation from Dr. Franz Kohl.

Table of Genera.

- Anal lobe of hind wings very large and extending to or beyond the apex of the submedian cell; third cubital cell, along the radius, shorter than along the cubitus; mandibles most frequently emarginate beneath. 2.
- Anal lobe of hind wings much shorter, *not* extending to the apex of the submedian cell; third cubital cell, along the radius, as long or longer than along the cubitus; second cubital cell triangular or petiolate, receiving both recurrent nervures, or the second recurrent is interstitial; abdomen with the segments depressed at apex as in *Cerceris*; pygidial area sharply defined in both sexes. *Palarus*, Latreille.
2. Eyes in ♂ *not* converging and meeting above as in *Astatus*; first and second dorsal abdominal segments with an acute margin laterally; ventral segments 6–7 free, 2–5 exhibiting in part prominent transverse swellings; marginal cell short, very broadly truncate; third transverse cubitus uniting with radius a little before the truncature; tarsal comb developed. ♂. (♀ unknown.) . . . *Homogambrus*, Kohl.
 3. First abdominal segment not strikingly elongate. 4.
 - First abdominal segment elongate, longer than the widest part, narrower towards base, imperfectly petioliform.

Face *without* a trace of swelling or longitudinal fold along the inner eye margin, usually with a rounded central swelling on the upper part of the vertex; pronotum lying deeply beneath

the apex of the mesonotum ; clypeus with 4 median teeth anteriorly ; pygidium bare ; hind tibiae without special characters, the tarsi of usual length, the basal joint hardly half as long as the tibiae ; comb of front tarsi short. (♂ unknown.)..... Parapiagetia, Kohl.

Face with slight, blister-like swellings in the middle appearing as a strong transverse swelling ; no swelling on the upper frontal part; the hind ocelli lying in a flat basis ; pronotum only slightly impressed beneath the apex of the mesonotum, the collar long ; metanotum as long, or nearly, as wide ; pygidial area almost bare, with small bristles only at apex ; hind femora at basal third beneath emarginate and with a tooth, often only with a blunt process ; tarsi elongate, the basal joint of hind tarsi very distinctly longer than half the length of the tibiae ; teeth of front tarsal comb weak, short and slender..... Piagetia, Ritsema.

4. Face *without* a swelling or fold along the inner eye margin ; pronotum more or less deeply impressed beneath the apex of the mesonotum ; metanotum usually shorter than the mesonotum ; claws simple ; mandibles emarginate beneath..... 11.

Face *with* a swelling or fold along the inner eye margin..... 5.

5. Second cubital cell not petiolate, always sessile..... 6.

Second cubital cell petiolate ; mandibles *without* a tooth within, emarginate beneath on outer side ; front tibiae on outer side spinous ; pygidial area bare, with the sides converging posteriorly ; legs, especially the femora, stout ; hind tibiae not ridged ; ventral plate of second segment without swelling..... Larraxena, Smith.

6. Mandibles *with* an emargination on under side..... 8.

Mandibles *without* an emargination on under side ; pronotum impressed beneath the apex of the mesonotum, especially laterally ; claws unusually long, simple..... 7.

7. Mandibles with a subbasal tooth and a strong subapical tooth within (♀) ; hind margins of the dorsal abdominal segments distinctly depressed ; pygidial area (♀) and the dorsal plate with very distinct scattered punctures, appearing (without taking into account the scattered erect hairs) bare and shining ; hind tibiae not ridged ; front tibiae outwardly not spinous ; body and legs with long hairs..... Paraliris, Kohl.

Mandibles within, not far from the base, with one tooth in ♂, with two teeth in ♀ ; in the latter case the second tooth is distinctly

- smaller than the first; no subapical tooth within; hind margins of dorsal abdominal segments *not* distinctly depressed; pygidial area in ♀ clothed with shorter hair and stiff bristles towards apex; dorsal segments thickly tomentose, or at least with a fine pubescence; metanotum not emarginate behind; hind tibiæ longly ridged behind; front tibiæ outwardly usually spinous. Liris, Fabr.
8. Mandibles *without* a tooth within; pygidial area in ♀ bare, *without* stiff bristles, at most with a very fine pubescence at apex only; hind tibiæ behind not ridged, or the ridge scarcely indicated. 10.
Mandibles *with* one or two teeth within before the middle, near the base; pygidial area with stiff bristles, usually indistinct at apex; lateral margins of the pygidium convergent behind; front tarsal comb with stiff spines. 9.
9. Metanotum longer than the mesonotum; pygidial area clothed with a silvery pubescence; anterior femora in ♂ *not* marginate near the base. Notogonia, Costa.
Metanotum shorter than the mesonotum; pygidial area bare towards the base, but with short, stiff hairs at apex; anterior femora in ♂ emarginate near the base. Ancistromma, Fox.
10. Claws *not* unusually long, simple; front femora either toothed or simple; lateral ridges of the pygidial area (♀) feebly curved, not distinctly convergent; ventral plate of the second abdominal segment without deplanate places; punctuation of the head and thorax distinct, proportionately not fine; abdomen in ♂ usually densely punctured, with or without a pygidial area; mesosternal suture wanting. Larra, Fabr.
Claws unusually long, with a median tooth; pronotum only slightly impressed beneath the apex of the mesonotum, more towards the sides than medially; front femora without a tooth; pygidial area with the lateral margins parallel or, in only a few cases, convergent posteriorly; ventral plate of the second abdominal segment with two deplanated places at the base, which are separated by a keel-like elevation; abdomen in ♀ shining, with the margin of the segments slightly tomentose; legs rather stout; ♂ with the claws simple, the mesosternal suture distinct posteriorly. . . . Motes, Kohl.
11. Face medially *without* a swelling, at the most with two small tubercles above the base of the antennæ; legs unusually stout; abdomen not coarsely punctured; second dorsal segments not margined at sides. 12.

- Face medially *with* a well defined, rounded, smooth, shining swelling, placed at an equal distance between the front ocellus and the base of the antennæ; epinemia of mesepisternum distinct; front femora in ♂ without an emargination; tarsal comb in ♀ composed of very long flexible bristles; abdomen very coarsely punctured; second dorsal segment sharply margined at sides; pygidial area in both sexes bare. Prosopigastra, Costa.
12. Pygidial area clothed with short, stiff bristles; hind ocellar cicatrices linear, hooklike; tarsal comb in ♀ with rather short spines; front femora in ♂ either simple or emarginate near base beneath. Tachytes, Panzer.
- Pygidial area bare; hind ocellar cicatrices oval; tarsal comb in ♀ with long, flexible spines. Tachysphex, Kohl.

SUBFAMILY II.—Lyrodinæ.

In this subfamily the ocelli are always distinct, normal, never aborted, the pronotum usually long, while the second cubital cell is never petiolate or triangular.

The distinct ocelli easily separate the group from the Larrinæ, while the venation of the front wings and the longer pronotum separate it from the Nitelinæ and the Pisoninæ.

The known genera may be recognized with the aid of the following table:

Table of Genera.

- Marginal cell at apex truncate, or rarely rounded, but always *with* a more or less distinct appendage; two or three cubital cells. 2.
- Marginal cell lanceolate, *without* an appendage; three cubital cells.
- Submedian cell shorter than the median, the second cubital cell receiving both recurrent nervures, the second recurrent entering it very close to the apex; eyes convergent above; mandibles not excised beneath. Heliocausus, Kohl.
- Submedian cell a little longer than the median, the second cubital cell receiving only one recurrent nervure at or near its middle, the first recurrent nervure received by the first cubital cell near its apex; eyes only slightly convergent above; mandibles deeply excised beneath; cubitus in hind wings originating far beyond the transverse median nervure. Zoyphium, Kohl.
2. Front wings with two cubital cells. 4.
- Front wings with three cubital cells.

Second cubital cell receiving both recurrent nervures. 3.

Second cubital cell receiving only one recurrent nervure—the second, the first recurrent nervure received by the first cubital cell near its apex.

Transverse median nervure interstitial with the basal nervure, or uniting with the median vein a little before it; cubitus in hind wings originating *beyond* the transverse median nervure; eyes somewhat convergent above; mandibles excised beneath beyond the middle. Sericophorus, Smith.
= Tachyrhostrus, Sauss.

3. Transverse median nervure interstitial with the basal nervure; cubitus in hind wings originating somewhat *beyond* the transverse median nervure; collar long; eyes parallel; mandibles strongly excised beneath. Lyroda, Say.

Transverse median nervure uniting with the median nervure *before* the origin of the basal nervure; cubitus in hind wings originating much *before* the transverse median nervure.

Eyes submarginate within, convergent above; clypeus transverse, the anterior margin arcuate; mandibles at apex acute, unarmed; beneath excised beyond the middle. Laphyragogus, Kohl.

Eyes not at all emarginate within, strongly convergent above; clypeus large; mandibles excised beneath with two blunt teeth on inner margin. Leianthrena, Bingham.

4. Submedian cell much shorter than the median; second cubital cell receiving both recurrent nervures; cubitus in hind wings originating beyond the transverse median nervure. Gastrosericus, Spinola.

SUBFAMILY III.—Nitelinæ.

In this group the ocelli are also distinct, but the venation of the front wings is quite distinct from the Lyrodinæ, while the pronotum is shorter, transverse. From the Pisoninæ it is also distinguished by venation, and by having *no* pygidial area.

The genera falling in this group are distinguished as follows:

Table of Genera.

Front wings *with* a marginal cell. 2.
Front wings *without* a marginal cell.

The group is very closely allied to the *Miscophina*, the only reliable character to distinguish it being the distinct pygidial area, although, as a rule, the tibial spurs and the pronotum are shorter than in the latter group.

Thirteen genera have been recognized, distinguished as follows :

Table of Genera.

- Marginal cell at apex truncate or rounded, with an appendage 3.
 Marginal cell lanceolate, not truncate at apex, or at most narrowly rounded, without an appendage.
 Front wings with three cubital cells 2.
 Front wings with two cubital cells, each receiving a recurrent nervure.
 Transverse median nervure *interstitial* with the basal nervure Taranga, Kirby.
 Transverse median nervure *not* interstitial joining the median vein *before* the origin of the basal nervure Parapison, Smith.
 2. Transverse median *not* interstitial joining the median vein *before* the origin of the basal nervure.
 Second cubital cell larger, more briefly petiolate, receiving both recurrent nervures, or the first recurrent nervure is interstitial with the *first* transverse cubitus; mandibles excised beneath; eyes only slightly emarginate within . . . Pisonopsis, Fox.
 Second cubital cell small, longly petiolate, receiving one or both recurrent nervures, or the second is interstitial with the second transverse cubitus: mandibles *not* excised beneath.
 Second cubital cell receiving both recurrent nervures, or the second recurrent is interstitial with the second transverse cubitus Pison, Spinola.
 Second cubital cell receiving only one recurrent nervure — the second, the first recurrent nervure received by the first cubital cell a little *before* the first transverse cubitus Pisonitus, Shuckard.
 Transverse median nervure interstitial, the second cubital cell triangular, receiving the second recurrent nervure near its apex, the first recurrent nervure interstitial with the first transverse cubitus; cubitus in hind wings originating *beyond* the transverse median nervure; hind femora much thickened towards apex, especially in the ♀, roughened and serrated on outer face Bothynostethus, Kohl.

3. Second cubital cell receiving only one recurrent nervure 4.
 Second cubital cell receiving both recurrent nervures, or the first is
 interstitial with the first transverse cubitus.

Submedian cell shorter than the median; cubitus in hind wings
 originating *beyond* the transverse median nervure; eyes within
 nearly parallel; mandibles excised beneath. . . Sphodrotes, Kohl.
 Submedian and median cells equal or nearly, the transverse
 median nervure being interstitial or nearly, with the basal
 nervure; cubitus in hind wings originating *beyond* the transverse
 median nervure; eyes convergent above; mandibles excised or
 sinuate beneath.

Hind tibiæ smooth, not serrate. Niteliopsis, Saunders.

Hind tibiæ strongly serrate and also spinose; mandibles with
 a deep emargination beneath; clypeus transverse, truncate
 and with a transverse impression along the anterior margin;
 hind coxæ normal, without a spine or tubercle. . . (Africa).

Pseudohelioryctes, Ashm., n. g.

(Type P. Foxii, Ashm.*)

Submedian cell a little longer than the median; cubitus in hind
 wings originating *before* the transverse median nervure; eyes
 more or less divergent above; mandibles beneath with a deep
 incision before the middle. Scapheutes, Handl.

4. Second cubital cell receiving the second recurrent nervure at the
 extreme apex, being almost interstitial with the second transverse
 cubitus. 5.
 Second cubital cell receiving the second recurrent nervure at or near
 the middle.

Transverse median nervure interstitial with the basal nervure or
 nearly; first recurrent nervure *interstitial* with the first trans-
 verse cubitus. Solierella, Spinola.

Transverse median nervure *not* interstitial, joining the median
 vein a little *beyond* the origin of the basal nervure; first
 recurrent nervure *not* interstitial with the first transverse
 cubitus. Sylaon, Picciola.

* Pseudohelioryctes? Foxii, n. sp.

= Helioryctes melanopygus, Fox nec Smith, Proc. Acad. Nat. Sc., Phil.,
 1896, p. 554.

Female. —Length, 14 mm. Head, thorax, antennæ, and all coxæ and trochanters,
 black; rest of legs and the abdomen, except the pygidium above (which is dusky),
 ferruginous; wings fuscous black.

5. Submedian cell somewhat shorter than the median; cubitus in hind wings originating *far* beyond the transverse median nervure; anterior tarsi in ♀ with a comb; tibiæ spinous; eyes large, convergent above..... *Plenoculus*, Fox.

North American Species.

- Subfamily I.--*Larrinae*. (11) *A. vegeta*, Fox.
- (1) *PALARUS*, Latreille. (12) ? *A. canescens*, Smith, ♀
(Larra).
- (3) *PARAPIAGETIA*, Kohl. (13) ? *A. arcuata*, Smith, ♀
(Larra).
- (4) *PIAGETIA*, Ritsema. (14) ? *A. vinulenta*, Cr.
- (5) *LARREXENA*, Smith. (10) *LARRA*, Fabr.
- (6) *PARALIRIS*, Kohl. (1) *L. analis*, Fabr.
- (7) *LIRIS*, Fabr. (2) *L. Cressonii*, Fox.
- (8) *NOTOGONIA*, Costa. (3) *L. Godmani*, Cam., ♀.
- (1) *N. argentata*, Beauv., ♀ ♂. (4) *L. rubritarsis*, Cam., ♂.
- (2) *N. nigripennis*, Fox, ♀. (5) *L. sonorensis*, Cam., ♀.
- (3) *N. aequalis*, Fox. (6) ? *L. rufipes*, Prov.
- (4) *N. violaceipennis*, Cam., ♀. (7) *L. interpennis*, Cr., ♀ ♂.
- (5) *N. montezuma*, Cam., ♀. (8) *L. rufipennis*, Fabr., ♀ ♂.
- (6) *N. Championi*, Cam., ♀. (11) *MOTES*, Kohl.
- (7) *N. truncata*, Cam. (1) *M. fulviventris*, Guer.
- (8) *N. argentifrons*, Cam. (2) *M. splendens*, Ashm.
- (9) *N. beata*, Cam., ♂. (12) *PROSOPIGASTRA*, Costa.
- (10) *N. chrysura*, Cam., ♂. (13) *TACHYTES*, Panzer.
- (11) *N. argenticauda*, Cam., ♂. (1) *T. validus*, Cr.
- (12) *N. apicipennis*, Cam., ♂. (2) *T. mandibularis*, Patt., ♀.
- (13) *N. panamensis*, Cam., ♂. (3) *T. harpax*, Patt., ♂.
- (9) *ANCISTROMMA*, Fox. (4) *T. calcaratus*, Fox, ♂.
- (1) *A. aurantia*, Fox. (5) *T. exornatus*, Fox, ♀.
- (2) *A. copax*, Fox. (6) *T. breviventris*, Cr., ♀.
- (3) *A. distincta*, Smith. (7) *T. praedator*, Fox.
- (4) *A. dolosa*, Fox. (8) *T. columbiæ*, Fox.
- (5) *A. tenuicornis*, Smith. (9) *T. crassus*, Patt.
- (6) *A. discreta*, Fox. (10) *T. pepticus*, Say.
- (7) *A. conferta*, Fox. (11) *T. fulviventris*, Cr.
- (8) *A. divisa*, Patt. (12) *T. spatulatus*, Fox.
- (9) *A. consimilis*, Fox.
- (10) *A. rugosa*, Fox.

- (13) *T. aurulentus*, Fabr.
 (14) *T. contractus*, Fox.
 (15) *T. distinctus*, Smith.
 (16) *T. elongatus*, Cr.
 (17) *T. sericatus*, Cr.
 (18) *T. rufofasciatus*, Cr.
 (19) *T. abdominalis*, Say, ♀.
 (20) *T. obscurus*, Cr., ♀.
 = *texanus*, Cr., ♂.
 (21) *T. parvus*, Fox.
 (22) *T. abductus*, Fox.
 (23) *T. mergus*, Fox.
 (24) *T. dives*, Lepel.
 (25) *T. yucateensis*, Cam., ♀.
 (26) *T. gautemalensis*, Cam., ♀.
 (27) *T. andreniformis*, Cam.
 (28) *T. argentipes*, Cam.
 (29) *T. ornatipes*, Cam.
 (30) *T. ferrugineipes*, Cam., ♂.
- (14) *TACHYSPHEX*, Kohl.
 (1) *T. Ashmeadii*, Fox, ♀.
 (2) *T. Belfragii*, Cr., ♀.
 (3) *T. spinosus*, Fox, ♀.
 (4) *T. posterus*, Fox, ♀.
 (5) *T. tarsatus*, Say, ♀ ♂.
 (6) *T. texanus*, Cr., ♀ ♂.
 (7) *T. pissatus*, Fox, ♂.
 (8) *T. dubius*, Fox, ♂.
 (9) *T. semirufus*, G., ♀.
 (10) *T. asperatus*, Fox, ♀.
 (11) *T. antennatus*, Fox, ♀.
 (12) *T. parvulus*, Cr., ♂.
 (13) *T. fuscipennis*, Fox, ♀.
 (14) *T. fusus*, Fox, ♀ ♂.
 (15) *T. terminatus*, Smith, ♀ ♂.
 (16) *T. apicalis*, Fox, ♀ ♂.
 (17) *T. acutus*, Patt.
 (18) *T. amplus*, Fox, ♀ ♂.
- (19) *T. montanus*, Cr.
 (20) *T. decorus*, Fox, ♀.
 (21) *T. inusitatus*, Fox, ♂.
 (22) *T. excatus*, Fox, ♀.
 (23) *T. consimilis*, Fox, ♀ ♂.
 (24) *T. quebecensis*, Prov., ♀ ♂.
 (25) *T. compactus*, Fox, ♂.
 (26) *T. triquitrus*, Fox, ♀.
 (27) *T. aethiops*, Cr., ♀ ♂.
 (28) *T. nigrior*, Fox, ♀ ♂.
 (29) *T. pauxillus*, Fox, ♀ ♂.
 (30) *T. punctifrons*, Fox, ♀ ♂.
 (31) *T. mundus*, Fox, ♀.
 (32) *T. minimus*, Fox.
 (33) *T. psilocerus*, Kohl.
 (34) *T. rufomaculatus*, Cam., ♀.
 (35) ? *T. laevifrons*, Smith (Larra).
 (36) ? *T. pennsylvanicus*, Beauv.
 (Larra).
- Subfamily II.—*Lyrodinae*.
 (15) *HELIOCAUSUS*, Kohl.
 (16) *ZOYPHIUM*, Kohl.
 (17) *SERICOPHORUS*, Smith.
 (18) *LYRODA*, Say.
 (1) *L. triloba*, Say.
 (2) *L. subita*, Say.
- (19) *LAPHYRAGOGUS*, Kohl
 (20) *LEIANTHRENA*, Bingham.
 (21) *GASTROSERICUS*, Spinola.
- Subfamily III.—*Nitelinae*.
 (22) *MISCOPHOIDES*, Brauns.
 (23) *NITELA*, Latreille.
 (24) *NITELOPTERUS*, Ashmead.
 (1) *N. slossonæ*, Ashm.
 (25) *SALIOSTETHUS*, Brauns.
 (26) *MISCOPHINUS*, Ashmead.
 = *Hypomiscophus*, Ckll.
 (1) *M. laticeps*, Ashm.

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| (2) <i>M. californicus</i> , Ashm. | (34) SPHODROTES, Kohl. |
| (3) <i>M. texanus</i> , Ashm. | (35) NITELIOPSIS, Saunders. |
| (4) <i>M. arenarum</i> , Ckll. | (1) <i>N. inermis</i> , Cr. |
| (27) MISCOPHUS, Jurine. | (2) <i>N. plenoculoides</i> , Fox. |
| (1) <i>M. americanus</i> , Fox, ♀ ♂. | (3) <i>N. striatipes</i> , Ashm., ♀. |
| Subfamily IV. — <i>Pisoninae</i> . | (36) PSEUDOHელიORYCTES, Ashmead. |
| (28) TARANGA, Kirby. | (37) SCAPHEUTES, Handlirsch. |
| (29) PARAPISON, Smith. | (38) SOLIERELLA, Spinola. |
| (30) PISONOPSIS, Smith. | (39) SYLAON, Picciola. |
| (1) <i>P. clypeata</i> , Fox, ♀ ♂. | (40) PLENOCULUS, Fox. |
| (2) <i>P. triangularis</i> , Ashm., ♀. | (1) <i>P. Davisii</i> , Fox. |
| (31) PISON, Spinola. | (2) <i>P. propinquus</i> , Fox. |
| (1) <i>P. laevis</i> , Smith. | (3) <i>P. punctatus</i> , Ashm. |
| (2) <i>P. conformis</i> , Smith. | (4) <i>P. Cockerellii</i> , Ashm. |
| (3) <i>P. fasciatum</i> , Kohl. | (5) <i>P. abdominalis</i> , Ashm. |
| (32) PISONITUS, Shuckard. | (6) <i>P. niger</i> , Ashm. |
| (33) BOTHYNOSTETHUS, Kohl. | (7) <i>P. Peckhami</i> , Ashm. |
| (1) <i>B. distinctus</i> , Fox, ♀ ♂. | (8) <i>P. albipes</i> , Ashm. |
| (2) <i>B. Saussurei</i> , Kohl. | |

CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.—IV.

BY GEO. B. KING, LAWRENCE, MASS.

Diaspinæ (concluded).

- (71) *Chionaspis furfurus*, Fitch; 1856–1869. N.

A very common species in Massachusetts, recorded from Amherst, Worcester, Andover, Lawrence, and Methuen, on wild red cherry, pear, wild and cultivated apple, flowering quince, choke-berry, shad-bush, and black alder. It is known from Virginia, Maryland, Pennsylvania, Illinois, Indiana, West Virginia, North Carolina, Ohio, New York, Kentucky, Rhode Island, Connecticut, Georgia, Utah, Kansas, New Jersey, and Washington, D. C., on choke-cherry, wild red cherry, wild and cultivated apple, crab apple, pear, peach, Japan quince, cherry currant, red flowering currant, and European mountain ash.

- (72) *Chionaspis furfurus*, var. *fulva*, King; 1899–1898. N.

Found at Lawrence, Mass., on buckthorn, *Rhamnus catharticus*, L.

- (73) *Chionaspis spartinae*, Comst.; 1883. N.

On salt marsh grass, at Woods Holl, Mass. Coll. Prof. Trelease.

- (74) *Chionaspis Linthneri*, Comst.; 1883-1898. I.

An abundant species at Stoneham, Ballardvale, Andover, North Andover, and Methuen, Mass., on *Alnus*, *Benzoin odoriferum*, *Corylus americana* and *Amelanchier canadensis*. Described from New York.

- (75) *Chionaspis pinifoliae*, Fitch; 1855-1895. N.

Mr. R. A. Cooley (in litt.) informs me that he has found this species common at Reading and Amherst, Mass., and has known it to occur in this State for at least four years. How much longer, it is impossible to tell, as there is no references to its occurrence in literature. I did not find it until May 30th of this year, at Methuen, Mass., on our native hard pine, *Pinus rigida*. It has been recorded from Maine, New York, Ohio, Colorado, New Mexico, Michigan, Missouri, and Illinois.

- (76) *Ischnaspis longirostris*, Sign.; 1882-1898. I.

Collected by Mr. J. W. Folsom at the Botanic Gardens, Cambridge, Mass., 1898 (Ckll. in litt.).

- (77) *Fiorinia fioriniae*, Targ.; 1867-1898. I.

Collected by Mr. J. W. Folsom at the Botanic Gardens, Cambridge, Mass., 1898 (Ckll. in litt.). It is recorded from Washington, D.C., Maryland, Colorado, and California, on *Camellia*, Japan quince, *Arabia* and *Ficus elastica*.

Lecaniinae, subjoined.

- (78) *Lecanium Canadense*, Ckll.; 1895-1898. N.

On white oak at Lawrence, Mass. Prof. S. J. Hunter records it from Kansas on *Ulmus americana*. It was originally described from Canada as *Lecanium caryae*, var. *Canadense*, Ckll. It is also recorded from Maine on *Ulmus*.

- (79) *Lecanium Cockerelli*, Hunter; 1899-1897. N.

Described by Prof. Hunter from Kansas on *Ulmus americana* and *Juglans nigra*. This is the most common and conspicuous *Lecanium* found in Massachusetts, and is found on *Quercus alba*, *Q. rubra*, *Q. ilicifolia*, and sweet fern, *Comptonia asplenifolia*, at Lawrence, Methuen, Dracot, and Andover.

Five species have been added to our list since the publication of the first article. The above last two are added to complete the list up to date, and include all the described Massachusetts Coccidæ known to me, but by no means all that really exist, as I have many others not yet studied, and expect to find many more new to our fauna.

NOTES.

(1) Reviewing the preceding literature on the Coccidæ of Massachusetts, we find 79 species and varieties to inhabit the State, leading all others by 7. New Mexico* comes next with 73. California at least 65, and Colorado 37 species.

(2) Massachusetts has 44 native and 35 introduced species, with one whose home is as yet unknown, but no doubt is introduced, which would make 36. Greenhouses produce 16, all of which are introduced species, 10 ant-nest coccids, with 5 attended by ants, 3 of these sometimes found in nests of ants, and 6 species have been found on fruit exposed for sale.

(3) The locality in which the writer has been collecting Coccidæ is about six miles each way, the City of Lawrence being in the centre; in this small district he has found (11) *eleven* species that had been previously recorded from Massachusetts, 39 new to the fauna of the State, 15 new species and 7 new varieties and one genus new to the United States.

(4) The first ant-nest coccid known to occur in the United States was found by Prof. Cockerell in Colorado in 1891. Previous to this there had been only one other species known to inhabit ant-nests—a very peculiar pearl-like creature found in the West Indies. We have now 24 species of coccids normally inhabitants of ant-nests; 15 of these are found in the United States, 10 of which have been found by the writer in Massachusetts. England has 4, New Zealand, Trinidad, Ceylon, France, and the West Indies, 1 each.

(5) I am very much indebted to Prof. Cockerell for his valuable assistance in the study of our Massachusetts Coccidæ, and in no instance have I passed upon the identity of a single species. All have been studied and determined by him. Furthermore, he has had the kindness to look over all my MS. and made such changes as he, in his good judgment, saw fit, and no less than 41 letters have been written by him to me in connection with the Coccidæ of Massachusetts. It should be said, also, that Dr. L. O. Howard has taken much interest in all the parasites sent him, reared by me from coccids. And also Prof. J. D. Tinsley, who has described jointly with me some of my new species of Dactylopiids. I wish to publicly thank them and acknowledge their many kindnesses.

*(6) Since the above was written, Prof. Cockerell and Mr. Parrott have described five new species and varieties from New Mexico.

A CHECK-LIST OF THE MASSACHUSETTS COCCIDÆ.

Icerya, Sign.

I. Purchasi, Mask., 1878.

Eriococcus, Targ.

E. azaleæ, Comst., 1881.

E. quercus, Comst., 1881.

Gossyparia, Sign.

G. ulmi, Geoff., 1764.

Ripersia, Sign.

R. lasii, Ckll., 1896.

R. Kingii, Ckll., 1896.

R. flaveola, Ckll., 1896.

R. Blanchardii, King and Ckll., 1897.

R. minima, Tinsley and King, 1899.

Dactylopius, Costa.

D. citri, Riss., 1813.

D. adonidum, L., 1769.

D. sorghieulus, Forbes, 1885.

D. sorghieulus, var. Kingii, Ckll., 1897.

D. claviger, King and Tinsley, 1897.

D. Cockerellii, King and Tinsley, 1898.

D. pseudonipæ, Ckll., 1897.

Phenacoccus, Ckll.

P. aceris, Sign., 1875.

P. americanæ, King and Ckll., 1897.

Sphaerococcus, Mask.

S. sylvestris, Ckll. and King, 1898.

Asterolecanium, Targ.

A. quercicola, Bouche, 1851.

Orthesia, Bosc.

O. insignis, Dougl., 1887.

Kermes, Auctt.

K. galliformis, Riley, 1881.

K. pubescens, Bogue, 1898.

K. nivalis, King and Ckll., 1898.

K. Kingii, Ckll., 1898.

Lecanopsis, Targ.

L. lineolata, King and Ckll., 1897.

Lecanium, Illig.

L. hesperidum, L., 1758.

L. hemisphæricum, Targ.

(= coffeæ, Auctt., not of Walker.)

L. quercifex, Fitch, 1856.

L. quercifex, Fitch, var., 1898.

L. filicum, Boisd., 1868.

L. corylifex, Fitch, 1856.

L. cynosbati, Fitch, 1856.

L. tessellatum, Sign., 1873.

L. Kingii, Ckll., 1898.

L. tarsale, Sign., 1873, var.

L. Fletcheri, Ckll., 1893.

L. nigrofasciatum, Perg., 1898.

L. pallidior, Ckll. and King, 1899.

L. caryæ, Fitch, 1856.

L. canadense, Ckll., 1895.

L. (saissetia) anthurii, Boisd., 1868, var.

L. Cockerelli, Hunter, 1899.

Pulvinaria, Targ.

P. innumerabilis, Rathv., 1854.

P. innumerabilis, var. tilia, King and Ckll.

P. Macluræ, Kennicott in Fitch, 1855.

Lichtensia, Sign.

- L. viburni*, Sign., 1873, var.
Aspidiotus, Bouche.
 A. hederæ, Vall., 1829.
 A. aurantii, Mask., 1878.
 A. perniciosus, Comst., 1881.
 A. ancylus, Putn., 1877.
 A. ficus, Ashm., 1888.
 A. cyanophylli, Sign., 1869.
 A. articulatus, Morg., 1889.
 A. Forbesi, Johnson, 1896.
 A. Fernaldi, Ckll., 1898.
 A. smilacis, Comst., 1883.
 A. sp. prob. young of *A. dictyospermi*, Morg., 1889.
 A. Crawii, Ckll., 1897.
Diaspis, Costa.
 D. carneli, Targ., 1868.
 D. amygdali, Tryon, 1889.
Aulacaspis, Ckll.
 A. rosæ, Bouche, 1833.
 A. bromeliæ, Kerner, 1788.
 A. Boisduvalii, Sign., 1869.
 A. elegans, Leon.
- Parlatoria*, Sign.
 P. proteus, Curt., var. *Pergandii*, Comst., 1881.
 P. zizyphus, Lucas, 1853.
 P. (prob. *proteus*) var. *crotonis*, Ckll., 1895.
Mytilaspis, Sign.
 M. pomorum, Bouche, 1851.
 M. citricola, Pack, 1870.
 M. Gloverii, Pack, 1869.
Pinnaspis, Ckll.
 P. pandani, Comst., 1881.
Chionaspis, Sign.
 C. furfurus, Fitch, 1856.
 C. furfurus, var. *fulva*, King, 1899.
 C. pinifoliæ, Fitch, 1855.
 C. spartiniæ, Comst., 1883.
 C. Lintneri, Comst., 1883.
Ischnaspis, Dougl.
 I. longirostris, Sign., 1882.
Fiorinia, Targ.
 F. fioriniæ, Targ., 1867.

NOTES ON SOME HYMENOPTERA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Vespa diabolica, Sauss., mut. *Fernaldi* (Lewis).—Prof. C. H. T. Townsend collected last year some specimens of *V. diabolica* and *V. occidentalis* on the Rio Ruidoso, N. M. Among the former I find an example which exactly agrees with the description of *V. Fernaldi*, Lewis, but it is evidently only a form of *diabolica*.

Bembidula mesillensis, Ckll.—This was described as a variety of *B. capnoptera*, but the discovery of the female shows it to be a distinct species. The ♀ differs from the ♂ by having the thoracic markings cream-colour instead of deep yellow; the clypeus entirely creamy-yellow, it and the narrow lateral marks densely covered with silvery pubescence; the marks on scutellum round instead of pear-shaped; the anterior tarsi with a well-formed blackish comb. The last dorsal segment is strongly

punctured, with a smooth median line, and has a yellowish spot on each side. The lateral ridges are only indicated posteriorly, and that feebly. Legs as in the ♂, except for the tarsal comb. This ♀ was taken by Prof. Townsend at La Cueva, Organ Mts., N. M., 5,300 ft., Sept. 3, 1898, at flowers of *Lippia Wrightii*.

Sphecodes perlustrans, Ckll.—This was described from a single specimen; a second was taken at Mesilla Park, N. M., March 30th, 1899, by Mr. S. MacGregor. A new examination shows the mandibles to be notched, not simple as described.

Perdita grandiceps, Ckll.—Described from a single ♂. Prof. Townsend took 3 ♂ 1 ♀ (♂ ♀ in cop.) at flowers of *Fallugia paradoxa*, var. *acuminata*, Wooton, La Cueva, Organ Mts., N. M., Sept. 3rd, 1898. The ♀ runs to 21 in my *Perdita* table in Bull. Lab. Denison Univ., 1898, and to 23 in the table in Proc. Phila. Acad., 1896. It differs from *P. phymatæ* by its colourless nervures; from *P. verbesinæ*, var. *nigrior*, by being only 5 mm. long; from *P. sidae* by having the flagellum pale ochreous (instead of orange) beneath, the upper edge of the clypeus not at all whitish, the mesothorax more bare, with considerably shorter hairs, and the marginal cell broader in proportion to its length. From the ♂ *grandiceps* it differs by having the head of ordinary shape and size, the cheeks unarmed, and the face wholly without light markings. The tip of the abdomen is brownish-orange.

Melissodes grindeliæ, Ckll.—To the localities for this species must be added Los Vegas, N. M., where I took a ♂ in July.

BEES AND FLOWERS.

Prunus (garden plum).—At Santa Fé, N. M., in the spring of 1898, Miss Myrtle Boyle collected from the flowers *Andrena prunorum*, Ckll. (♀ ♂, the ♂ a var. with antennæ wholly black), *Halictus sisymbrii*, Ckll. (♀), and *Osmia lignari*, Say (♂).

Ungnadia speciosa (det. E. O. Wooton).—At Dripping Spring, Organ Mts., N. M., April 23rd and 24th, I found this beautiful shrub in full bloom. On April 23rd the following bees were visiting it: *Osmia lignaria*, Say (♂ ♀, abundant); *Xylocopa arizonensis*, Cr. (abundant); *Agapostemon texanus*, Cr. (1 ♀); *Augochlora neglectula*, Ckll. (abundant); *Halictus amicus*, Ckll. (♀, abundant); *Bombus Morrisoni*, Cr. (a few); and *Anthophora lesquerellæ*, Ckll. (♂, rare).

Dithyræa wislizeni.—On the campus of the N. M. Agricultural College, Mesilla Park, May 7th, 1898, the following bees were at the flowers: *Anthidium larreae*, Ckll. (one); *Neolarra pruinosa*, Ashm. (many); *Perdita callicerata*, Ckll. (♀); *P. exclamans*, Ckll. (♂), and *P. punctosignata*, Ckll. (♀). The species of *Perdita* had appeared before their proper flowers (*Baileya* and mesquite) were out, so they resorted to the *Dithyræa*.

SOME NEW SPECIES OF HADENA.

BY JOHN E. SMITH, RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

Hadena (Xylophasia) runata, n. sp.

Ground colour smoky brown or blackish, varying in shade even to a reddish admixture. Head usually a little reddish, with a black band crossing the front. Collar usually paler at the base, crossed by a black line about the middle; usually tipped with paler scales. Thorax with a distinct divided crest, which often contains an admixture of lighter vestiture, patagiæ with paler tips, a blackish submargin, and a disk as dark as the general ground colour. Primaries powdery, mottled, with all the markings well defined; no contrasts, save that the median space is usually darker than the rest of the wing. Basal line geminate, black, including a few whitish scales, and reaching to a narrow, short basal line which ends at the point of junction with the transverse marking. T. a. line black, geminate, the outer defining line well marked, the inner vague, except at the internal margin, where an oblique black shade extends inward along the margin. The line is well removed from the base, outcurved as a whole and in the interspaces. T. p. line geminate, blackish, the inner portion lunulate and best marked, the outer more even, less defined, marked with blackish dots on the veins. As a whole, it is outwardly bent on the costa, and then runs very evenly and almost parallel with the outer margin. A vague median shade is visible on the costa and between the ordinary spots, but becomes lost below that point. S. t. line white or very pale brown, only a little irregular, except where it forms a distinct, though small, W on veins 3 and 4. Two or three sagittate black spots precede the line at the W, and a dusky shade may extend the full length, sometimes adding other spots, or again losing all of them. Terminal space darker, except at apex. A series of black terminal lunules. Fringes cut with pale and a similar line at base, giving a festooned appearance. Claviform short, broad, more or less black filled, a black or blackish shade extending to the t. p. line and broadening outwardly. Orbicular oval, oblique, with a black ring inwardly edged by pale scales, of the palest ground colour. Reniform large, kidney-shaped, upright, incomplete above and below, outlined in black outside of a paler line, the centre of the ground colour. As the median space is darker than the rest of the wing, these spots are relieved and somewhat contrasting. Secondaries smoky gray, paler at base, fringes yellow at base; there is a dusky discal lunule and a blackish

terminal line. Beneath powdery dull gray, primaries with a vague discal blotch, secondaries with a lunule and an exterior line.

Expands 1.25-1.60 inches = 30 to 40 mm.

Habitat: Winnipeg, Manitoba, June and July (Hanham); Pullman, Washington (Piper).

A good series of specimens shows little variation save in the shade of the ground colour. In genital structure the insect resembles *desperata*; but in general appearance it is much more like *indirecta*, *mactata* or *divesta*.

Hadena (Xylephasia) Barnesii, n. sp.

In general appearance resembling *auranticolor*, and heretofore confused with that species. It is smaller, however, in average expanse, much paler and less red in ground colour, and altogether a more sordid, less brilliant species. The violet shading in the s. t. space of the old species is replaced by gray or whitish in the new form, and the secondaries are of a dull, even smoky gray, without a trace of yellow or red in the ground or whitish at the base. All the markings are present on the primaries, less strigate and better defined than in *auranticolor*; but without preceding dashes to the w, or interspaceal streaks in the terminal space.

Expands 1.50-1.68 inches = 37-42 mm.

Habitat: South Dakota (Truman); Glenwood Springs, Colorado, in September; Yellowstone Park, Wyoming (Dr. Barnes).

A series of seven specimens has been compared with a similar number of *auranticolor* before the species was decided to be distinct. There is no difficulty in separating the two forms, but it is not so easy to localize the differences. The much duller primaries and the very evenly dark secondaries are the most obvious features.

The sexual parts of the male are disproportionately small, but of the same general type as in *auranticolor*.

Hadena (Xylephasia) diunea, n. sp.

Ground colour an even, obscure fuscous gray without contrasts. Head with a dusky frontal line, collar with a blackish central line, patagiæ with a black submargin. Abdomen mouse gray. Primaries with all the maculation present, but obscure. A short black basal streak. Basal line geminate, smoky, marked on the costa only. T. a. line geminate, smoky, incomplete, outwardly curved, and with small out-curves in the interspaces, marked by an oblique black streak on the

inner margin. T. p. line geminate, very even, well out-curved over the cell, but only a little indrawn below; inner portion blackish, narrow, interrupted; the outer punctiform and sometimes obsolete. S. t. line paler, broken, very vague, with a W reaching the outer margin, preceded by a series of blackish spots or shadings, which may be in part or altogether obsolete. A series of smoky terminal lunules. Ordinary spots concolorous. Claviform well defined by a narrow black line, extending across the median space to the t. p. line, or connected with it by a black shade. Orbicular moderate or large, varying somewhat in form, with a smoky, often incomplete, outline. Reniform large, upright, well defined at the sides only. Secondaries evenly mouse gray, the fringes paler. Beneath smoky, powdery, with a common outer line and discal spots on all wings.

Expands 1.40-1.60 inches = 35-40 mm.

Habitat: Volga, South Dakota (Truman).

This is the species which I called *idonea*, Grt., in my revision of the species of *Xylophasia*, Proc. U. S. N. M., XIII., 438, 1890, and credited from Mr. Grote's original description to Texas, Arizona, and Wisconsin. The species resembles *cariosa* in general type of maculation, but is entirely even in ground colour, and, as I pointed out, unquestionably good. I found when studying the genus originally that there were three allied forms generally mixed under *cariosa*. I separated the most intensely marked species, resembling *verbascoides* as much as it did *cariosa*, under the name *nigrior*; from specimens named by Mr. Grote I identified the form here described as *idonea*. Later I had an opportunity of comparing the Guenée and Grote types directly in the British Museum, and found, to my surprise, that both names were applied to one species. Comparing the two original descriptions, it will be seen that Guenée had a specimen distinctly shaded with reddish, while Mr. Grote had one in which this was replaced by a dirty luteous gray.

The present name is based on four males in rather bad shape, received from Mr. P. C. Truman; but I have seen others sufficient to indicate that there is very little variation.

Hadena (Luperina) virguncula, n. sp.

Ground colour dull reddish gray. Thoracic vestiture interspersed with gray hairs, giving it a hoary appearance; no markings. Primaries without contrasts, median space a little darker above the middle, terminal space evenly dusky, s. t. space dusky on the costa. Basal line

indicated by a few black scales. T. a. line geminate unusually far from base, outer defining line blackish, inner scarcely traceable, except for the somewhat paler included shade, outwardly oblique, irregularly out-curved in the interspace, and reaching the inner margin at about its middle. T. p. line geminate, not much out-curved over the cell, and only a little in-curved below; inner defining line blackish and partly lunulate, outer even smoky, broken and almost lost below vein 3. S. t. line very even, of the ground colour, defined by the darker terminal space and a dusky preceding shade. A series of black, small, terminal lunules. Orbicular barely indicated by a few blackish scales. Reniform large, upright, sub-quadrate, as a whole paler than the ground colour, so as to be relieved and somewhat prominent. Secondaries smoky, fringes whitish. Beneath smoky with pale powderings, a common outer line, and on secondaries with a discal spot. Vestiture of the legs and breast with a reddish tinge.

Expands 1.60 inches = 40 mm.

Habitat: Garfield Co., Colorado, 6,000 feet (Bruce).

A single female which has been awaiting a mate some ten years or more. The species has the wing-form and general habitus of *passer*, Gn., but it is unlike any of the forms of that variable species. It has scarcely a trace of a claviform, and the complete neatly defined s. t. line, and very oblique irregular t. a. line, will serve as further distinctive features.

Hadena allecto, n. sp.

In maculation almost like *mactata*, all the observed differences being well within the range of variation; but without a trace of the reddish or brown shadings of the old species; all is black and gray. The median space is the darkest part of the wing, the ordinary spots being very large and of the paler ground, save for a central filling in the orbicular.

Expands 1.40 inches = 35 mm.

Habitat: Calgary, Sept. 17 (Dod); Brandon, Manitoba (Hanham); Volga, So. Dakota (Truman).

Six specimens, representing both sexes, are before me, and do not vary a single mm. in expanse. I considered them for a long time as a local race of *mactata*, and so named them for my correspondents who have other specimens of this species. In actual ornamentation there is no appreciable difference, but the difference in colour is constant, and the genitalia of the male confirm the distinctness of the more western form, though the general type is the same.

Hadena catalina, n. sp.

Ground colour a pale reddish luteous, more or less powdered with leaden gray, which, on the primaries, may darken all save the median space, and strongly mark even this. Basal line geminate, leaden gray, reaching into the submedian interspace. T. a. line blackish, geminate, outwardly oblique and slightly out-curved in the interspaces. T. p. line blackish, geminate, inner portion narrow, crenulate, outer punctiform, the black being followed by white dots; as a whole slightly and evenly bisinuate. S. t. line pale, irregularly sinuate. A row of small blackish terminal lunules. Fringes dusky, with a pale line at base, and cut with pale. A vague leaden gray median shade is marked on the costa between the ordinary spots, is lost in the reniform, but sometimes reappears below, running close to and parallel with the t. p. line to the inner margin. Claviform small, outlined by gray scales; evident in all specimens. Orbicular moderate, rather irregular, outlined in blackish and with a leaden gray centre. Reniform large, oblique, a little constricted centrally, black ringed and filled with blackish, forming the most prominent feature of the ornamentation. Secondaries with a smoky shade which darkens outwardly; a dusky discal lunule, and a narrow median line; fringes yellow, with a smoky interline. Beneath paler, powdery; the wings darker outwardly, both pairs with discal spots and outer dusky lines. Head and thorax immaculate, or the collar may have a leaden gray central line and the patagiæ a blackish submargin.

Expands 1.12-1.28 inches = 28-32 mm.

Habitat: Catalina Springs, Arizona, April 8-12.

Five specimens from the U. S. National Museum, collected by Mr. E. A. Schwarz. In wing-form the species resemble *mactata*, and the secondaries are distinctly excised below the apex. The ground colour and the contrasting dark reniform give a resemblance to certain forms of *Mamestra* allied to *trifolii*, and there is nothing in *Hadena* with which this species is likely to be confused.

The male genitalia are simple; the harpe is enlarged at tip, oblique, inwardly fringed with spinules; the clasper is stout, moderate in length, not much curved, and blunt at tip.

Of the locality above given (not to be found on any map), Mr. Schwarz says it is "a small spring at the foot of the Sta. Catalina Mountains, 15 or 16 miles north-west of Tucson, and about 2,900 feet above sea level; situated within the giant Cactus forest, directly above the region of *Larrea mexicana*."

Hadena pausis, n. sp.

Ground colour powdery fuscous gray or brown. Head a little paler, with a darker frontal line. Collar with a broken dusky central shading, patagiae with a blackish submargin. Primaries with all the usual markings present, but broken and not contrasting. A curved black streak in the submedian interspace, from the base to the t. a. line, is the most prominent feature of the wing. Basal line geminate, broken, brown, reaching to the black streak, and within this is the palest part of the wing. T. a. line geminate, blackish, broken, a little out-curved in the interspaces, and moderately out-curved as a whole. T. p. line geminate, blackish, very even; outwardly oblique from costa to vein 6, then forming between 5 and 6 an almost right angle, and nearly evenly oblique from that point to the inner margin. S. t. line pale, very irregular and obscure; broken and scarcely traceable in some specimens. A crenulated, black terminal line. Fringes interlined with blackish. Little dusky rays are sent into the terminal space on the interspaces. A blackish or black quadrate spot connects s. t. and t. p. line in the submedian interspace, and a similar connection may be made by a narrow black line opposite the cell. Claviform large, extending more than half way across the wide median space; outlined in blackish, else concolorous. Orbicular irregular, moderate in size, outlined in blackish, brown centred. Reniform narrowed above, dilated below, and constricted in the centre; oblique, outlined in black and with a blackish central shade. A vague median shade is traceable on the costa only. Secondaries smoky, paler at base, with a vague discal lunule. Beneath dark gray, powdery, with a common outer line and a discal lunule on all wings; but all this may be wanting, and the wings be evenly powdered.

Expands 1.20-1.40 inches = 30-35 mm.

Habitat: Los Angeles County, California, in June (Coquillett); San Francisco, Cal.

This species belongs to the *binotata* series, and agrees with it in wing-form. The primaries have the outer margin a little toothed; the secondaries are excised below the apex. In the eight specimens before me there is little variation, the only obvious features being the black basal streak and, to a less extent, the black patch in the s. m. interspace connecting the t. p. and s. t. lines.

The genitalia of the male are somewhat complex. There is an oblique triangular patch at the tip of the harpes densely set with spinules,

and there are two claspers, both of them stout, curved and obtusely terminated.

Hadena ethnica, n. sp.

Ground colour an even, dark, smoky brown. Head and thorax immaculate. Primaries with all the usual markings present, but so slightly relieved that at first sight they seem altogether wanting. Ordinary lines geminate, marked on the costa by pale spots which form the only visible contrasts. T. a. line nearly upright, feebly out-curved in the interspaces. T. p. line punctiform, the points being followed by minute white dots, very evenly bisinuate. S. t. line irregular, marked by scattered white scales, and by a very slight difference between s. t. and terminal space. A series of evident terminal lunules. Claviform very short and broad. Orbicular rather large, round, darker filled. Reniform large, upright, a little constricted centrally, with a somewhat darker filling. Secondaries smoky brown, with a coppery tinge and a dusky terminal line. Fringes yellow at base, and tipped with whitish. Beneath smoky brown, powdery, secondaries with a darker discal spot.

Expands 1.80 inches = 45 mm.

Habitat: Yosemite, California; emerged July 23rd, 1891, from a larva on Manzanita.

This is an overgrown species of the *binotata* series. The fringes on both wings are unusually long, on the primaries just a little scalloped, on the secondaries distinctly excised below the apex. The size and inconspicuous markings should separate it without difficulty from its allies.

The male genitalia are very simple; the harpes subparallel, tip oblique and fringed with spinules, clasper moderate in length, slender, curved and acute at tip.

Hadena laetabilis, n. sp.

Head and thorax dull brown, immaculate, save that the tips of collar, edge of patagiae and dorsal tuftings are sprinkled with bluish. Abdomen pale mouse gray, with a brown tuft on the basal segment. Primaries, median space smoky brown, basal and s. t. spaces a light sapphire blue, appearing almost transparent in fresh specimens, markings brown. Basal line brown, marked on the costa only, this region being more or less brown powdered to the t. a. line. There is also a brown powdering at the inner margin in some specimens. T. a. line marked by the difference in colour between basal and median space, nearly upright to the submedian vein, then with a long out-curve to the inner

margin. T. p. line single, black, lunulate, outwardly curved on the costa and over cell, slightly in-curved below. S. t. line visible as a slender blue thread through the brown costal region, then lost in the blue of the s. t. space, this tinge extending to a series of submarginal blackish lunules, and beyond them to the slender dark terminal crescents. Fringes brown, with narrow yellowish interlines, and cut with whitish. Claviform small, black margined, concolorous, a blackish shading extending toward the t. p. line. A slender brown median shade line is marked on the costa, and is again traceable below the reniform, running close to and parallel with the t. p. line. Orbicular moderate or small, contrasting blue, centred with brown. Reniform large, broad, a little constricted centrally, somewhat indelined above and below, blue and contrasting. Secondaries whitish, with a slender, smoky extra-median line, and a broad, blackish outer margin. Fringes brown, with a yellow line at base. In one specimen with a vague discal lunule. Beneath, primaries smoky gray, powdery, with a blackish extra-median line, a pale or dusky spot marking the orbicular, and a yellowish lunule marking the reniform of the upper side. Secondaries white, yellowish toward and on costa, smoky at outer margin, with a narrow smoky outer line, and a dusky discal spot which may be absent.

Expands 1-1.20 inches = 25-30 mm.

Habitat: Santa Fé, New Mexico, July and August (Cockerell), Nos. 1657, 1827 and 3906.

Three male specimens of this very handsome species are at hand. It belongs to the series of which *Smaragdina transfrons* and *Bridghami* are examples, and when fresh is prettier than either. Unfortunately, the beautifully transparent blue dulls rapidly, and appears then like a thin wash of ultramarine over a layer of white. It cannot be easily confused with any other of our species.

The male genitalia are very simple; the harpes narrow obliquely to a somewhat acute tip, which has a fringe of spinules inwardly; the clasper arises from its middle, and is a slender, moderately long and only slightly curved hook.

Hadena viridimusca, n. sp.

Head and thorax brown, powdered with darker scales; head paler in front. Collar with a dark median line, sometimes paler than the thoracic disc. Thoracic tuftings distinct, the posterior paler and sometimes quite contrasting. Abdomen smoky; in the male the edges of the segments

distinctly white-marked. Primaries smoky red-brown, more or less overlaid by mossy yellow-green scales which normally fill the basal, terminal and part of the s. t. space, the centre of the ordinary spots and patches in the median space. Basal line evident, geminate, defining lines not well marked, included space pale and sometimes white-marked. T. a. line geminate, upright a little irregular, defining lines incomplete and not well marked, included space white, forming a somewhat prominent patch on the costa and extending inward a little on the inner margin. T. p. line geminate, not well defined, broken, out-curved over the reniform, then almost upright, included space more or less marked with white scales, especially in the costal region. S. t. line very irregular, marked by the contrast between the mossy powdering of the terminal and darker shading of the s. t. spaces. A series of blackish terminal lunules, followed by a series of pale or yellowish blotches at the base of the fringes and opposite the termination of the veins. A median shade line is traceable below the reniform. Orbicular small, round, black ringed, green centred. Reniform upright, moderate in size, incompletely outlined, a little constricted centrally. Claviform extending half way across the median space, outlined by black scales, yellow-green filled, and this greenish shade is usually continued beyond the spot across the median space. Secondaries deep smoky-brown, hardly paler at the base, fringes with a pale line at the base. Beneath gray, powdery, outer margins paler; with a common extra-median line and a black discal spot on all wings. Primaries with a whitish cloud on the costa at the inception of the extra-median line.

Expands 1.05-1.12 inches = 27-29 mm.

Habitat: Columbus, Ohio; VI., 20; VII., 9, at sugar (N. W. Tallant); Texas, V., 16 (Belfrage); New Jersey.

Four specimens, 2 males and 2 females, are at hand, and I have seen others. The species is allied to *miseloides* in appearance, but is smaller, with much narrower, stumpy wings. It is, perhaps, nearer to *marina*, with which I tried hard to identify it, but is not so bright as that species, the fringes are even, and the form of the primaries is different. The variation consists partly in the amount and intensity of the mossy green, which fades to yellow in old examples, and partly in the prominence of the white filling of the ordinary lines.

A NEW PLAGODIS.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Plagodis approximaria, n. sp.

Fore wings dark ochreous, paler about the faint purplish cloud that rests on internal margin; a cluster of blackish strigæ in centre of basal space on internal margin and a larger cluster in the black cloud; otherwise the ground colour is without strigæ. T. a. and t. p. lines slightly curved, broad, somewhat clouded, nearer together than usual, blackish brown, the t. p. line the more distinct. Hind wings paler, largely over-spread by a purplish shading that extends from a large cluster of dense blackish strigæ at inner angle. Thorax ochre, purplish in front and on the head. Expanse 50 mm.

Two males, Portland, Oregon, April 23rd, 1892. U. S. National Museum, type No. 4110.

SYNOPSIS OF SPECIES OF PLAGODIS.

Notch at inner angle of primaries nearly like the subapical excavation, so that the outer margin looks produced centrally.

Pale yellow, t. p. line diffuse, sinuate, shaded below; other lines obsolete..... *serinaria*, H.-S.

Ochreous, strigose, t. p. line distinct, straight, t. a. line fainter; discal dot a ring..... *alcoolaria*, Guen.

Notch at inner angle pronounced, the margin looking straight with a notch below.

T. a. line very faint and diffuse or absent.

Fore wing straw colour, notch moderate.

T. p. line present, not obscured.

No large purplish cloud beyond t. p. line; at most some strigose markings... *fervidaria*, H.-S.

A purplish cloud beyond t. p. line... *keutsingaria*, Pack.

T. p. line absent, lost in a large purplish cloud that reaches middle of wing..... *nigrescacia*, Hulst.

Fore wing cinerous clay colour; notch large. *emarginaria*, Guen.

T. a. line if faint, not diffuse; usually distinct.

T. a. and t. p. lines remote, narrow and discreet; hind wings usually with a narrow submarginal line..... *phlogosaria*, Guen.

T. a. and t. p. lines approximate, rather broad and a little clouded; hind wings without any line, a strigose cloud at inner angle..... *approximaria*, Dyar.

A NEW DACTYLOPIUS (FAM. COCCID.E) FROM ARIZONA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Dactylopius hymenocleæ, n. sp.—♀. Black when dry, entirely covered and concealed by the firm snow-white ovisac, forming a rounded mass about 4 mm. diam. These masses are adherent to one another, forming very conspicuous white cottony balls on the plant, having a diameter of from ten to twelve mm. The surface of the ovisac is rough, but not at all ribbed. The female, boiled and flattened under a cover-glass, is oval, about 4 mm. long. After being boiled in caustic soda, soaked in alcohol, and mounted in balsam, the insect is found to exhibit two different pigments: one a pale magenta, the other a dark bluish green. Skin with very numerous small circular glands, and a good many rather large dagger-shaped spines, in the caudal region. Legs and antennæ pale brown; legs fairly stout; coxa 99. Femur with trochanter 144, tibia 72, tarsus with claw 60 μ ; claw digitules slender, with a very small knob; claw with a minute denticle on the inner side just before the tip; antennæ 7-segmented, the segments measuring as follows in μ :—(1) 28. (2) 25–30. (3) 23–25. (4) 23–31. (5) 15–19. (6) 24–28. (7) 59–64. Embryonic larva large.

Hab.—On *Hymenoclea monogyra* in the river bottom, about six miles from Tucson, Arizona; collected three years ago by Prof. J. W. Toumey. I learn from Prof. Toumey that he had partially described this interesting species; but he has mislaid his MSS., and has no time at present to attend to the matter, so he has asked me to publish a description.

D. hymenocleæ is evidently related to *D. filamentosus*, Ckll., by its 7-segmented antennæ, its bluish-green pigment, and its manner of collecting in globular masses on the plant. The legs of *filamentosus* are larger (coxa 120, femur with trochanter 177, tibia 90, tarsus with claw 75 μ); and the denticle on the inner side of the claw, instead of being almost at the tip, is about half way between base and tip, and is quite large.

D. filamentosus has a large anal ring, with very large bristles upon it, and the region around it, while presenting a good many circular glands, does not have the dagger-shaped spines.

I will take this opportunity to record that Prof. Toumey sent me *Lecaniodiaspis rufescens* (Ckll.), collected at Tucson on *Fouquieria splendens*. I now consider this to be a valid species, distinct from *yuccæ*, as many specimens from various localities preserve the distinctive characters.

IN RE *SPILOSOMA CONGRUA*, WALK.

BY A. RADCLIFFE GROTE, A. M., ROEMER MUSEUM, HILDESHEIM, GERMANY.

In reference to the present controversy my testimony is as follows : I examined, in 1867, Mr. Walker's material. This represented a form unknown to me, undoubtedly a *Spilosoma*, not a species or form of *Hyphantria*. I was so struck with this that I drew up a description and carefully compared the palpi and antennæ. From these and the slightly larger size, I felt confident that it was a *Spilosoma* unknown to me at the time. The description is published in Trans. Am. Ent. Soc., 1868, but I have no copy, unfortunately, at this writing, of the paper. My memory is vivid that I compared it with *Hyphantria cunea*, and it was not that species nor any form of it. I conjectured even, at the time, that the material might be European with a wrong locality, so dissimilar was it from *S. virginica* or *S. latipennis*, the latter form being known to me from Stephen Calverley's collections from Long Island before, long before, its description by Stretch. Years afterwards, Dr. Thaxter sent me specimens from the East, which I at once recognized as *S. congrua* from my memory and my notes. These specimens belonged to *S. antigone*, which I set down accordingly as a synonym of *S. congrua* in the pages of the CANADIAN ENTOMOLOGIST.

There is, finally, one point to which I call attention. In 1867 Mr. Walker was arranging the collection. I directed his notice at the time to the fact that he had quite often mixed up different species under one name. It may be, then, that there were two species under *congrua*, but I think not. Mr. Walker adopted, at the moment, some of my suggestions, but the time was too brief to allow me to overhaul the whole of the American material, about which, as a whole, I knew besides, at the time, too little. But I knew *Spilosoma* and *Hyphantria* sufficiently as to give my determination weight. Now, it is a fact that Mr. Butler sorted over the collection, and as to this work Prof. Smith's Cat. No. 44 gives us, incidentally, valuable information. And it is a fact that I found in the Noctuids, in 1867, more mixing of species than comes out after Butler and Smith's sorting and taking or fixing of Mr. Walker's types. This was done without sufficient study of Mr. Walker's text in the B. Mus. Lists. Mr. Walker's material bore no type label; it was in 1867 (and, I think, again in 1880) simply stuck above the printed name, cut out of the B. M. Lists, as I remember. Misidentifications of Walker's description or determination occur in the genera *Apatela*, *Hadena*, *Mamestra*, *Hyppena*, etc. See my papers in the CANADIAN ENTOMOLOGIST and in the Proc. of the American Philosophical Society.

BOOK NOTICE.

THE PSYCHICAL POWERS OF ANTS.*—By E. Wasmann, S. J.

In this folio volume of 135 pages, which appears as "Zoologica, Heft 26," the author has given us his 95th contribution to the knowledge of guests and parasites of the ants and termites. As the title shows, the work is of a philosophical nature and deals with the mental side of ant-life, being in the main concerned with a refutation of the theory recently advanced by A. Bethe, who ascribes to ants and other invertebrates in general, no higher psychological rank than that of mere "reflex-machines."

The introduction reviews in brief the views of various earlier writers on the subject, and indicates the author's position, in that while rejecting Bethe's reflex theory, he also avoids the tendency exhibited by many naturalists to ascribe to ants powers of mind approaching those of man. Next follows a chapter devoted to an analysis of Bethe's theory, and showing Dr. Wasmann's reasons for the rejection thereof. In this connection the author writes: "It appears to me a reliable criterion that the animals concerned are not mere reflex-machines, but are guided, at least in the higher activities of life, by sensory perception and sensation on a foundation of inherited instinct is to be found in this: the possession of special sense organs in combination with a central nervous organ, as well as their manifold and suitable employments through which the animal turns impressions from the outside to use in the necessities of its life."

The succeeding chapter considers the question, "How do ants know one another?" And here much evidence is brought forth to show that the recognition is due to sensory perception, and is not automatic. The antennæ (especially the tips) are concerned in the discrimination, and Dr. Wasmann agrees with Forel that the detection of odour is very largely depended upon therefor. The subject next approached is "How do ants find their way?" Reference is made to the well-known fact that with many species a definite path is followed during journeys to and from the hunting-grounds, while in other species the wanderings are made much at random. Not only are ants able to follow their paths, but they also discern the direction in which the trail leads; *i. e.*, if it is running towards the nest or from it. Bethe has advanced his theory of the

*Die psychischen Fähigkeiten der Ameisen. Von E. Wasmann, S. J. Stuttgart, Erwin Nägele, 1899.

"polarization of the scent" to explain the objective difference between the going and the returning tracks, without (says Wasmann) telling us in what manner it is subjectively perceived by the ants. This theory is attacked by Dr. Wasmann on the ground of its inapplicability in some instances and contradiction in others. He declares that the phenomena may be explained in a much simpler way by assuming a different form of the scent which marks paths leading in different directions. He further ascribes sensory sensations and powers of impulse to these insects in order to account for their voluntary actions. His account (pp. 31 and 32) of *Formica sanguinea* taking a short cut from one nest to another, instead of following the ordinary path, is very suggestive of a true sense of direction. Some visual perception of changes in their paths is perhaps indicated by the observations recorded a few pages farther on.

Can ants see? The treatment of this query is masterly, and it is impossible to do the author justice in a short review. After showing that those ants which, like *Formica*, have well-developed compound eyes, are possessed of good visual powers, and the ability to use their visual images in various emergencies, he compares them with some other genera, such as *Solenopsis* (*S. fugax*), where the eyes, being composed of but four or five facets, are of much less sensitivity, though by no means insensible to light. Now is brought in a very pretty side issue, which bears, however, on the main question, namely, that those guests of the mimicry type which live with ants having well-developed eyes, copy their hosts in a different way from those which dwell among small-eyed forms. Among the large-eyed ants the mimicry by the guest begins in a resemblance of colour, followed by some likeness in build, this latter not extending to an actual copy of the details, but resting largely upon deceptive light reflections. Among guests of small-eyed or blind forms the mimicry begins with a resemblance in sculpture and vestiture, and this is succeeded by a likeness in build, which amounts to an actual similitude between the parts involved to the corresponding organs of the host; it culminates at last in the similarity of antennal structure between guest and host. These points are brought out in two lithographed plates. The conclusions to which they lead are these: In guests of such ants as can see well, the mimicry aims to deceive the sense of sight of the host; in guests of ants which are blind or nearly so, the mimicry aims to deceive the antennal sense of touch.

Regarding the powers of intercommunication, Dr. Wasmann not only contends that they possess these powers, but gives (on pp. 69 and 70) a scheme showing the signals which he has seen used to induce various activities. He holds that these actions point neither to an "intelligent understanding," nor to pure reflex action, but are sufficiently explained through sensory perception and the power of originating impulses.

The next chapter is of a controversial character, replying to the question, "What proof can be brought against our acceptance of psychical powers in ants?" The claim is made that Bethe has, without satisfactory knowledge of the facts and without exercise of necessary caution, set up his new reflex theory too boldly; and that this theory is unacceptable because of its innate indefensibility.

"The different forms of learning* in man and the animals" is the next subject treated. On the ground of biological facts, Dr. Wasmann recognized six divisions, as follows:

I. Independent learning.

1. Through instinctive exercise of reflex action.
2. Through sensory experience, by means of new associations of ideas presented thereby.
3. Through sensory experience and the intelligent application of earlier conditions to new.

II. Learning through the influence of others.

4. Through influence of the impulse of imitation.
5. Through human training.
6. Through intelligent instruction.

Regarding the above forms of learning, he makes, among others, the following generalizations:

In man alone are all six forms found. Other animals possess, according to the grade of their psychical development, either the first alone, the first and fourth, or the first, second, fourth and fifth.

In ants, as well as in the higher animals, the first, second, fourth and fifth are indicated. But the second and fifth forms are more highly developed in some other animals than in ants.

Only the third and sixth forms prove the possession of a real intelligence on the part of the learner. As these cannot be demonstrated in animals, no actual proof of animal intelligence is existent.

* I can get no better rendering of "Lernens" than this.

The proposition set up by the modern school of animal psychology, that learning through individual experience is a criterion of intelligence, must therefore be condemned as untenable. It is also incorrect to make "learning through individual sensory experience" a criterion of psychical power.

A further discussion of evidence offered on the psychical life of ants occupies many pages. The fact is brought out that many of the most ordinary of their activities bear directly on the subject, while on the other hand numerous apparently intelligent proceedings may be referred to simpler factors. Dr. Wasmann concludes that ants are neither intelligent miniature men nor mere reflex machines, but are organisms possessed of the power of sensory sensations and voluntary action, and that their inherited instincts may be modified in many ways through sensory perception and circumstances of sensation, as well as through the influence of previously gained experience. An application of the Darwinian factors, he says, fails to explain the development of the relations between ants and termites and their respective guests. The fact that ants, in their symbiosis, often raise their worst enemies, is as irreconcilable with the Darwinian form of the theory of descent as with the acceptance of an animal intelligence.

A supplement follows, describing six new species of myrmecophilous Proctotrupidæ. At the request of many readers, the author has added a list of his published works on myrmecophilism and termitophilism, which counts up ninety-four titles, the present contribution being the ninety-fifth.

No student of ant-life or of comparative psychology should fail to read this memoir. It is to be hoped that it will serve to still further stimulate the study of the mental side of ants, and in this line of investigation it sets a model of careful observation and cautious conclusions.

H. F. WICKHAM.

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TABLES FOR THE DETERMINATION OF THE GENERA OF COCCIDÆ.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

SUBFAMILIES.

- Males with compound eyes..... 1.
 Males with simple eyes..... 3.
 1. Anal ring with hairs (♀)..... *Ortheziinæ*.
 Anal ring hairless (♀)..... 2.
 2. Mouth-parts present in adult ♀; legs present in all
 stages..... *Monophlebinæ*.
 Mouth-parts absent in adult ♀; legs absent in intermediate stage
 of ♀..... *Margarodinæ*.
 3. Abdomen of ♀ terminating in a compound segment; anal orifice
 hairless..... 4.
 Abdomen of ♀ not so terminating..... 5.
 4. Insects with a scale formed entirely of secretionary matter without
 admixture of the exuviae; adult ♀ retaining legs and
 antennæ..... *Conchaspinae*.
 Insects with a scale composed partly of the exuviae; adult ♀ with-
 out legs..... *Diaspinae*.
 5. Insects enclosed in a resinous cell with three orifices; adult ♀
 apodous, with the terminal segments produced into a tail-like organ,
 bearing at the extremity the anal orifice; a prominent spinelike
 organ above the base of the caudal extension..... *Tachardiinæ*.
 Not so..... 6.
 6. Females with the posterior extremity cleft; anal orifice closed above
 by a pair of triangular plates..... *Lecaniinæ*.
 Not so; triangular anal plates absent..... *Coccinæ*.
 In preparing the above table, I have borrowed in places from that of
 Green, *Coccidæ of Ceylon*, p. 12.

ORTHEZIINÆ.†

- ♀ antennæ 8 jointed *Orthezia*, Bosc.*
 ♀ antennæ 4-jointed *Ortheziola*, Sulc.

MONOPHLEBINÆ.

- ♀ with a long posterior ovisac; ♂ without fleshy caudal processes . . . 1.
 ♀ with conspicuous waxy lamellæ or processes more or less covering the dorsal surface, but no long ovisac; ♂ unknown . . . *Walkeriana*, Sign.
 ♀ without a long posterior ovisac, or the lamellæ of *Walkeriana* . . . 2.
 1. Antennæ of adult ♀ 11-jointed *Icerya*, Sign.
 Antennæ of adult ♀ 9-10-jointed *Proticerya*, Ckll.
 2. ♂ abdomen without long fleshy processes *Palæococcus*, Ckll.
 ♂ abdomen with long fleshy processes, usually 8 in number *Monophlebus*, Leach.

There are several other supposed genera in the books. *Crypticerya*, Ckll., is essentially an *Icerya* without an ovisac; in the table it will fall with *Palæococcus*, but having no material of the latter genus, I am not sure whether the two are identical. *C. Townsendi*, var. *pluchæ*, has rows of waxy processes, clearly indicating an approach to the condition of *Walkeriana polei*.

Llaveia, Sign., *Ortonia*, Sign., *Protortonia*, Towns., *Guerinia*, Targ., and *Tessarobelus*, Mont., seem all to be identical with *Monophlebus*. *Drosicha*, Walk., is said to differ from *Monophlebus* by its 9-jointed antennæ, but it is doubtless an immature form of the latter genus.

The Monophlebinæ are really separable into two distinct tribes: (1) *Monophlebini*, in which the males have fleshy caudal processes, and the secretion of the females is powdery or cottony, including only *Monophlebus*; and (2) *Iceryini*, in which the males have not the fleshy processes, and the secretion of the females is more in the form of waxy plates, including *Icerya*, *Walkeriana*, etc.

†By the characters given, *Phenacoleachia*, n. g. (type *Leachia zealandica*, Maskell, Tr. N. Z. Inst., XXIII., p. 26), will fall in this subfamily, but it has strongly Dactylopiine features. Of this *Phenacoleachia zealandica* I have males, received from Mr. Maskell, and there is a slide of the females, from the same source, in the collection of the U. S. Department of Agriculture. The female resembles that of *Dactylopius*, having two long caudal filaments as in that genus, instead of the brush of *Orthezia*; but it has curious compound eyes consisting of ocelliform bodies forming a single ring round the head, interrupted above and below. The adult female, by its elongated form, elongated mentum, and curved spines at the end of the antennæ, resembles *Rhisacus*; but it differs in its 11-jointed antennæ (Maskell, l. c., Pl. VI., f. 3). The anal ring bears six stout bristles.

*An overlooked synonym of *Orthezia* is *Cyphoma*, Gistel, 1848, Nat. des Thier., p. 151. Type *O. characias*. (Not *Cyphoma*, Bolt., 1798).

MARGARODINÆ.

Tribes.

- Subterranean; anterior legs of both sexes adapted for digging *Margarodini*.
 Arboreal; anterior legs normal *Xylococcini*.

Margarodini.

Includes only *Margarodes*, Guilding (syn. *Porphyrophora*, Brandt.).

Xylococcini.

- ♂ with no caudal brush *Cælostoma*, Mask.
 ♂ with a caudal brush 1.
 1. Antennæ of adult ♀ 9-jointed; temperate region of N. Hemisphere *Xylococcus*, Lw.
 Antennæ of adult ♀ 10- or 11-jointed; Australia .. *Callipappus*, Guér.

CONCHASPINÆ.

Includes only *Conchaspis*, Ckll. *Ourococcus*, Fuller, has not been described; but a specimen of *O. casuarinæ* received from Mr. Fuller has a good deal of resemblance, in its caudal structures, to *Conchaspis*, but is yet quite distinct from it. The ♀ *Ourococcus*, very differently from *Conchaspis*, has a long glassy tail.

COCCINÆ.

Tribes.

- Living in galls in Australia; end of abdomen produced into a narrow tail *Brachyscelini*.
 Either not living in galls, or end of abdomen not specially modified to form a tail 1.
 1. ♀ enclosed in a complete sac of waxy or horny texture; skin usually with figure-of-8 glands; legs absent in adult; larva not fringed with spines *Asterolecaniini*.
 ♀ globular or reniform, in a hard shell; anal ring with hairs in larva, but not in adult; larva fringed with spines *Kermesini*.
 ♀ not enclosed in a hard shell or waxy or horny sac; or if enclosed (*Porococcus*, *Cryptoripersia*), antennæ and legs present 2.
 2. Newly-hatched larva with rows of dorsal spines *Eriococcini*.
 Newly-hatched larva without rows of dorsal spines *Dactylopiini*.

Brachyscelini.

- On *Casuarina*; larva not fringed with spines *Frenchia*, Mask.
 On *Eucalyptus*; larva fringed with spines 1.

1. Legs all present, but short and unfit for use.....*Apiomorpha*, Rûbs.
 Hind legs only present, these long.....*Opisthoscelis*, Schrad.
 Legs all absent.....*Ascelis*, Schrad.

The genus *Cystococcus*, Fuller, has not yet been sufficiently described to be included in the tables. It forms spherical galls on *Eucalyptus*, and has neither legs nor antennæ.

Asterolecaniini.

- Insect with a fringe of glassy rods.....*Asterolecanium*, Targ.
 Insect without such a fringe.....1.
 1. Antennæ well-developed in adult ♀.....*Lecaniodiaspis*, Targ.
 Antennæ rudimentary or absent in adult ♀.....2.
 2. Covering waxy; end of abdomen strongly chitinous..*Cerococcus*, Comst.
 Covering horny; end of abdomen not or hardly chitinous; scale
 with a caudal process ending with an orifice...*Solenococcus*, Ckll.
 (*Solenophora*, Mask.)
 Covering waxy; end of abdomen not chitinous; scale irregular, with
 no caudal process.....*Pollinia*, Targ.

Kermesini.

Contains only one genus, *Kermes*, Boitard. By the larva, this appears to be allied to the *Eriococcini*; whereas the larvæ of the *Asterolecaniini* show them to be allied to the *Dactylopiini*. *Kermes* has no triangular anal plates in any stage, and is not related to the *Lecaniinae*.

Eriococcini.

- Anal ring with hairs.....1.
 Anal ring without hairs.....4.
 1. Antennæ and legs absent in adult ♀.....*Nidularia*, Targ.*
 Antennæ and legs well formed in adult.....2.
 2. Adult naked to the last.....*Rhizococcus*, Sign.
 Adult surrounded by cotton, but dorsally naked...*Gossyparia*, Sign.
 Adult contained in a hard black scale.....*Porococcus*, Ckll.
 Adult living in a gall on oak; antennæ 6 jointed; tarsi 2-jointed;
 skin with figure-of-8 glands.....*Olliffiella*, Ckll.
 Adult forming a cottony sac.....3.
 3. Anal ring with 8 hairs; caudal lobes long.....*Eriococcus*, Targ.‡

*I suppose this belongs to *Eriococcini*, but the larval characters are not sufficiently known. The adult is naked, resting on a cushion of cotton, which surrounds it, as in *Gossyparia*, from which it is distinguished by lacking legs and antennæ.

‡The subgenus *Thekes*, Crawford (type *E. eucalypti*), has 7-jointed antennæ; those of typical *Eriococcus* are 6-jointed.

- Anal ring with 6 hairs ; no caudal lobes *Gymnococcus*, Dougl.
4. Legs and antennæ present and well-developed in adult ; skin with grouped glands and truncate spines ; last joint of larval antenna long *Pseudococcus*, Westw.
(*Coccus*, Sign.)
- Antennæ present, but only one pair of legs 5.
- Antennæ and legs absent ; not living in a gall ; newly-hatched larva with four rows of dorsal spines on each side of the middle line *Carpochloroides*, Ckll.
5. Only the hind legs present ; skin without grouped glands or truncate spines ; newly-hatched larva with only one complete row of dorsal spines on each side of the middle-line, but one or two other rows partially developed anteriorly *Capulinia*, Sign.
- Only the first pair of legs present, these very short ; living in a gall ; newly-hatched larva with two rows of dorsal spines on each side of the middle-line ; shape of adult elongate, with parallel sides, abdomen with long hairs *Cylindrococcus*, Mask.
- Olliffia*, Fuller, not yet described, is very close to *Eriococcus*.
Dactylopiini.
- Anal ring without hairs 1.
- Anal ring with hairs 2.
1. Adult ♀ with all the legs present ; first four small, hind pair very large ; margin with spines *Sphærococcopsis*, Ckll.†
- Adult ♀ with the antennæ minute, conical ; legs entirely absent ; skin with many circular glands *Sphærococcus*, Mask.
(Type *S. casuarinæ*, Mask.)
- Adult ♀ with the antennæ reduced to a mere tubercle ; spiracles small ; legs absent ; skin tuberculate, but without conspicuous glands *Phenicoccus*, Ckll.
(Type *P. Marlatti*, Ckll.)
2. With well-formed legs and antennæ in adult 3.
- Legs and antennæ absent or rudimentary in adult 15.
3. Antennæ 9-jointed 4.
- Antennæ 8- (sometimes 7-) jointed 6.
- Antennæ not more than 7-jointed 10.
4. Anal ring with 8 hairs *Puto*, Sign.
- Anal ring with 6 hairs 5.

†Type *S. inflatipes*, Mask., Tr. N. Z. Inst., XXV., p. 238.

5. ♀ having the aspect of a *Dactylopius* *Phenococcus*, Ckll.
♀ covered with waxy lamellæ, like an *Orthesia* *Ceroputo*, Sulc.
6. Insect with large projecting marginal tubercles *Tylococcus*, Newst.
Without projecting marginal tubercles 7.
7. Anal ring of ♀ with more than 8 hairs *Lachnodi*, Mask.
Anal ring of ♀ with 6 hairs 8.
8. ♂ with four caudal filaments *Oudablis*, Sign.*
♂ (so far as known) with only two caudal filaments 9.
9. Body very elongate; antennæ 8-jointed, shorter and stouter than in
Dactylopius; eyes present; mentum short. . . . *Pergandiella*, Ckll.
(*Westwoodia*, Sign.)
Body oval, usually with cottony tassel *Dactylopius*, Costa.
Body subglobular, enclosed in a cottony sac *Erium*, Crawford.
(Type *E. globosum*.)
10. Antennæ 6- or 7-jointed; when 7-jointed, distinguished from *Dactylo-*
pius by the stouter legs and usually subterranean habitat 11.
Antennæ 5-jointed; form elongate; anal tubercles promi-
nent *Rhizacus*, Kunck.
11. ♂ apterous, with relatively short antennæ *Fonscolombia*, Licht.
(*Pseudochermes*, Nitsche; *Apterococcus*, Newst.)
Not so 12.
12. Legs extremely thick, like crab's claws *Pseudoripersia*, Ckll.
Not so; legs ordinary 13.
13. ♀ enclosed in a waxy sac *Cryptoripersia*, Ckll.
Not so 14.
14. "Antennæ very close together" (Tinsley) *Ripersiella*, Tinsley.
(*R. rumicis* and *maritima*.) †
Antennæ normally placed *Ripersia*, Sign.
15. Newly-hatched larva elongate, with 6-jointed antennæ 16.
Newly-hatched larva oval or suboval 17.
16. Terminal antennal segment of newly-hatched larva oval, little longer
than the one before. *Pseudolecanium*, Ckll.
Terminal antennal segment of newly-hatched larva very large, as
long as the three before *Chatococcus*, Mask.

*A genus of few species, found in Europe; when the male is unknown, the female is usually referred with safety to the large genus *Dactylopius* rather than to *Oudablis*.

†Prof. Tinsley has named this genus, and indicated its characters, in a thesis for the degree of B.S., presented to the N. M. Agricultural College, May 31, 1899. He will shortly prepare a paper describing the genus in detail.

17. Larva with 5-jointed antennæ; anal ring of adult with only 4 hairs..... *Cryptococcus*, Dougl.
 Larva with 6-jointed antennæ, joint 6 long; anal ring of adult with 6 hairs. *Antonina*, Sign.
 Larva with 7-jointed antennæ, sides very hairy; anal ring of adult and larva with 17 hairs..... *Kermicus*, Newst.

TACHARDINÆ.

- Anal ring with numerous bristles..... *Tachardia*, Blanchard.
 Anal rings without bristles; anus furnished with two membranous lobes, the edges of which are bristly..... *Gascardia*, Targ.

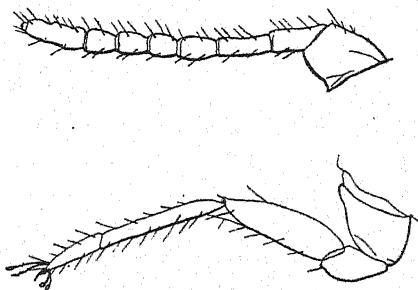
(To be continued.)

THE CLOVER-ROOT MEALY BUG.

Dactylopius trifolii, Forbes.

BY R. H. PETTIT, ASSIST. ENTOMOLOGIST AGR. COLLEGE, MICH.

On July 1, 1893, the writer collected a number of mealy bugs on clover (*Trifolium pratense*) at Ithaca, N. Y. They were found at about the level of the ground between the several stems of the plant, and also on the roots under the soil. On July 17 of this year the same insect was

FIG. 34.—*DACTYLOPIUS TRIFOLI*.

found on the same plant at Agricultural College, Mich. As they were both supposed to be *D. trifolii*, Forbes, a comparison was made with the original description.*

In this description the insect is credited with having seven joints to the antennæ, and as the adult females found here and at Ithaca have eight, the male pupa was examined. This form has seven joints, and

* 14th Rep. of State Entomologist of Ill. for year 1884, by S. A. Forbes.

agrees perfectly with the description. The material left by Mr. G. C. Davis, on which he based his article on "Mealy Bugs and Their Allies"†, was examined and found to agree with both the description and the recently collected specimens. As no description of the adult female has as yet been found by the writer, it was thought that one might be of some interest.

The adult female measures a little more than two millimetres in length, is reddish-brown in colour, covered with a coating of waxy or mealy secretion. The legs are dirty yellow in colour. From the sides project from 15 to 17 (usually 17) waxy processes, forming a fringe around the body in the usual manner, with the shortest filaments near the head, and those near the tail considerably longer, sometimes one-third as long as the body. The antennæ are 8-jointed; joint 1 is swollen, as broad as long; 2 and 3 subequal, each about as long as 1; 4, 5, 6 and 7 subequal, a little over half as long as 2 or 3; 8 usually a little longer than 5 and 6 joined. There is considerable variation in 4, it is sometimes smaller than 5, 6 or 7, and sometimes slightly larger. The legs are dirty yellow, in length the tarsus is slightly more than half the tibia, which about equals the femur. Digitules 4; the 2 superior long and slender, the 2 inferior shorter and more stout. (The digitules were not distinct, but appeared as described.) Anal tubercles not very prominent, with a mass of small glandular spots, and bearing one long hair, with sometimes several smaller ones. Among the glandular spots are placed two conical projections or processes on each tubercle. These processes are from two to three times as long as broad at the base.

The figures of the antenna and leg (Fig. 34) are from drawings made from the Ithaca specimens in 1893.

NEW COCCIDS FROM KANSAS.

BY PERCY J. PARROTT, MANHATTAN, KANSAS.

Antonina Nortoni, Parrott and Ckll.

Sac white, subglobular, cottonlike, completely enveloping female.

♀ oval, plump, cream-coloured, with slight tinge of brown on margin. Boiled in caustic potash, becomes transparent, with the exception of the antennæ, the two pairs of spiracles, and ultimate segment, including anal region, which are a dark yellowish-brown. There are many single glands, especially towards and about posterior segments;

† Insect Life, Vol. VII., 1894, p. 168.

they are less numerous anteriorly. On outer side of each spiracle there is a crescentic group of rather large circular glands, placed very close together. Antennæ aborted, short, thick, composed of three segments measuring respectively 18-25, 13-16, 27-28 mm. Mouth-parts large. Spiracles chitinous, large and extended. Anal orifice circular, situated in a depression, surrounded by a strong chitinous ring. Anal ring with six long, stout hairs measuring from 53 to 89 mm. in length. Around

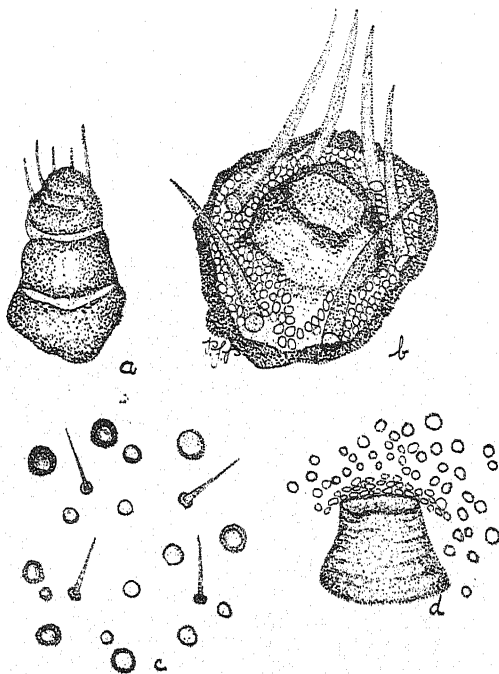


FIG. 35.—ANTONINA NORTONI.

the anal area are many slender hairs, very much smaller than the bristles of the anal ring.

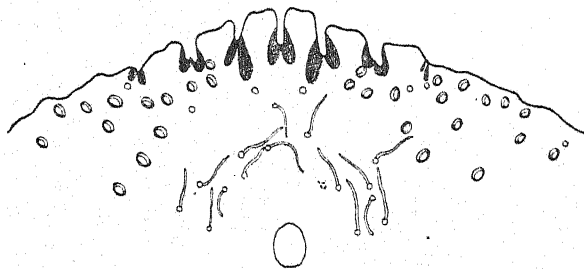
In Fig. 35 *a* represents the antenna; *b*, anal ring; *c*, portion of derm about anal ring; *d*, spiracle.

This species was collected by Mr. J. B. Norton, on April 25th, 1899, at the bases of the stems of *Boutelona racemosa* on Blue Mont, Manhattan, Kans.

Aspidiotus (Targionia) Marlatti, sp. nov.

♀ scale 2 mm. in diameter, flat to slightly convex, dark reddish-brown, resembling walnut, on margin to a lighter shade at centre; exuviae lateral, large, black, often covered with brownish secretion; ventral pellicle thin, light reddish-brown, not easily separated from scale, and leaves no mark on host plant when detached.

♀¹ oval, white, with irregular spots of yellow; ultimate segment yellow, with the margin dark brown and strongly chitinous. Boiled in caustic potash, the female becomes transparent, with the exception of the lobes, which remain yellow. There are three pairs of lobes (Fig 36), which are short, broad, and quite widely separated, with the sides parallel; first pair either broadly rounded or truncate, and notched at distal end; second and third lobes similar, broader than mesal lobes, notched on



Aspidiotus Marlatti

FIG. 36.

margin, with that part lateral of the notch generally the larger. There is one small spine at the base of each of the mesal lobes, one larger one at the base of the lateral margin of each of the second and third lobes respectively, and another one on margin as distant from the third spine as the combined width of one mesal and one second lobe. Chitinous processes are of medium size, one pair to each incision; the ones lateral of mesal lobes are the largest. Plates are short and truncate, and apparently easily shed, as they do not appear in the boiled specimens; in the untreated specimens there are from one to two plates to each incision. There are no groups of circumgenital glands. The dorsal glands are large and fairly numerous. On each side and posterior of the anus there are a few tubular glands.

This interesting species was collected by Mr. J. B. Norton, who found it upon the base of the stems of grasses, *Andropogon furcatus* and *A. scoparius*, on Blue Mont, Manhattan, Kansas, and is named in honor of Mr. C. L. Marlatt, in recognition of his many valuable contributions to the knowledge of the Coccidæ.

THE HABROPODA AND DIDASIA OF CALIFORNIA.

BY CARROLL FOWLER, BERKELEY, CAL.

The following is a list of the species of these two groups occurring in California, with notes on those forms known to me :

HABROPODA, Smith.

A small group of bees, comparatively local in their habits, and in appearance very much like the larger species of Anthophora.

Legs with black pubescence. *floridana*.

Legs with pale pubescence.

Abdomen (except on first segment) with depressed, pale pubescence interspersed with erect, black hairs ; ♂ with scape yellow in front. *depressa*.

Abdomen without black hairs, pale pubescence erect ; ♂ with scape black. *miserabilis*.

1. *Habropoda floridana*, Smith.—Redonda, Cal. (H. O. Woodworth), May 23. One female.

2. *Habropoda depressa*, n. sp.

♀ 14 mm., ♂ 12–13 mm. Clothed with mixed black and pale pubescence, the latter depressed on the abdomen.

♀.—Head black, clothed with ashy pubescence, mixed with black on vertex, dense and white on cheeks and labrum, thin on clypeus, which is strongly punctured ; antennæ black. Thorax clothed with pale pubescence, thin on disc and strongly mixed with black above, dense white beneath ; wings subhyaline ; legs clothed with pale pubescence more or less tinged with yellow, very dense on posterior femora and tibiæ, brown on metatarsi beneath, a bunch of black pubescence at apex of posterior metatarsi ; claws reddish. Abdomen black, narrow apical margins of the segments brown ; first segment clothed with erect, white pubescence, except on apical margin, where it is black ; the remaining segments with appressed, yellow pubescence interspersed with erect black hairs. Ventral segments shining, fringed with long, pale pubescence.

♂.—Differs from ♀ in having narrow lines on the sides of the face, clypeus except narrow lateral margins, mandibles except tips, and scape in front yellowish-white ; legs with white pubescence, which is a little longer on the tibiæ and posterior tarsi behind, and quite long on the anterior and posterior femora ; venter thickly clothed with white pubescence.

Habitat: Berkeley, Cal., Feb. 22 to May 1; numerous specimens. Santa Catalina Island (H. O. Woodworth), June 21; one specimen. During the earlier part of the season several specimens were collected upon the white flowers of *Cytisus poliferus* in the botanic garden. About the middle of April quite a number of females were observed collecting pollen from oak blossoms. A few males were collected upon *Ranunculus californicus*. On April 22, 1899, several nests were examined. They are, in general, much like those of many other bees of solitary habits, being grouped together in quite large numbers, and each one consisting of a single burrow extending about a foot into the hard earth. The cell at the end is about 10 millimetres wide by 16 in length, lined with a thin, hard layer of wax and filled with a mixture of pollen and honey. A large number of the bees had taken possession of an old squirrel hole, from the inside of which, at a depth of about a foot, their burrows were found extending off in all directions, while the outside burrows extended nearly straight downward. The traces of a number of old burrows would indicate that the same spot had been visited from year to year. Only a few of the nests at this date were complete, and no larvæ were found.

3. *Habropoda miserabilis*, Cress., ♂.

♀.—Differs from male in being a little larger, having the face black, posterior legs clothed with long dense pubescence slightly tinged with yellowish, that on apical portion of the middle tibiæ above fuscous, at the tips of the posterior metatarsi a bunch of black hair. Both males and females have the pubescence on the under side of the legs more or less fuscous. The males before me have the "large sub-trefoil mark on the clypeus" extending somewhat on the region above.

San Francisco, Cal.; April. Twenty specimens, collected chiefly upon *Phacelia californica*.

DIDASIA, Patton.

The bees of this genus fly somewhat later in the season. None of the species are common in Berkeley, but *D. enavata* is very abundant in Southern California during the early part of summer.

Abdomen with black pubescence, except on segments 1-2; not banded *nerea*.

Abdomen with pale pubescence; white bands or fascia on apical margins of the segments.*

**D. alboresta*, Prov., seems to differ from *enavata* and *cinerea* chiefly in size, being only 8 mm. in length. The species is unknown to me.

Tarsi dark brown or black; ♂ with the third antennal joint slender, three times the length of the second. *cinerea*.

Tarsi pale ferruginous; ♂ with third antennal joint not especially slender; about twice the length of the second. *enavata*.

1. *Didasia nerea*, n. sp.

10.5 mm. Clothed with black pubescence, ochraceous on thorax and base of abdomen above.

♀.—Head black, finely punctured, clothed with long, dense, black pubescence, thinner on vertex and ochraceous on posterior part of occiput; antennæ entirely black. Thorax black, clothed with dense pubescence, yellowish above, black beneath; tegulæ black; wings hyaline, veins dark brown, second submarginal cell about half the length of the first, narrowed somewhat above; legs clothed with black pubescence, long and dense on posterior tibiæ and metatarsi. Abdomen black, with yellowish pubescence on the first two segments, somewhat mixed with black on the second, the remaining segments with rather short, black pubescence. Venter clothed with black pubescence.

♂.—Differs from female in having the pubescence, throughout, longer and more bushy, that on legs with a somewhat griseous appearance in certain lights; the posterior femora and tibiæ somewhat incrassate, their metatarsi slender and curved, and the apex with a subacute tooth, which is not especially prominent; apical segment of the abdomen bidentate.

Habitat: Tulare, Cal. (H. O. Woodworth); May. 10. Two specimens.

2. *Didasia alboresta*, Prov.—Los Angeles, Cal.

3. *Didasia cinerea*, n. sp.

♂ 13 mm. Clothed with cinereous pubescence, apical margins of the abdominal segments with white fascia.

♂.—Head black, punctured, clothed with griseous pubescence, slightly darker on vertex; apical margin of the clypeus nude; antennæ entirely black, third joint slender, broadening toward apex, three times the length of the second. Thorax black, finely punctured, clothed with rather dense, ashy pubescence, tinged with yellowish above; tegulæ dark brown to black, shining; wings hyaline, veins dark brown to black, second submarginal cell about half the length of the first, narrowed above; legs clothed with rather long, pale pubescence; the four posterior legs robust, the femora and tibiæ incrassate, the basal joint of the posterior tarsi

curved and having at apex beneath a prominent, curved, subacute tooth, which is flattened and dilated at base; tarsi brownish-black. Abdomen black, shining, clothed with erect, pale pubescence, longest at base and more or less mixed with black on segments 4-6; segments 2-6 with distinct, white, marginal fascia; apical segment bilobate. Venter clothed with white pubescence.

Habitat: Berkeley, Cal.; May and June. Three males. This species is closely allied to *D. australis*, which, however, has the second submarginal cell smaller and not narrowed above. It may readily be distinguished from the male of *D. enavata* by the longer third antennal joint, the much more prominent lobes of the apical segment of the abdomen, etc.

4. *Didasia enavata*, Cress. (= *D. tricineta*, Prov.).—Santa Catalina Island, Santa Barbara, and Redlands, Cal. (H. O. Woodworth); June. Numerous specimens.

DESCRIPTION OF THE LARVA OF HADENA MISELOIDES, GUEN.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Egg.—A little less than spherical, the base flat. Twelve sharp ribs run to the vertex, which is large, circular, reticulate, with a central elevation at the micropyle; one-third of the way down these ribs neatly alternate with twelve others, forming twenty-four ribs around the base. Ribs straight; space distinctly, regularly cross striate. Diameter .8, height .7 mm.

Stage I.—Head rounded, mouth pointed; shining yellowish; width .5 mm. Body thickened at thorax and joint 12, robust, sharply tapering at joint 13, which is placed almost under joint 12. Translucent yellowish, shining and sticky like a slug, the food showing by transparency. Setæ minute and pale, not glandular, tubercles obsolete. Rests curled on the back of the leaf; several larvæ on the same leaf, but not gregarious. Hatched when found.

Stage II.—Head whitish, shining; width .7 mm. Body as before, but less yellowish, shining, but not sticky and green from the food. Joint 2 in front is yellowish, and the sides of joint 12 are whitish from the large tracheæ showing through the skin. Setæ nearly imperceptible.

Stage III.—Head small for the body, somewhat retracted, pale luteous; width 1.1 mm. Body robust, thorax and joint 12 enlarged, the latter somewhat angular, shining, translucent green, appearing all dark

green from the food ; three white dots on each segment on tubercles i. and ii., and a third not on a tubercle before ii., in line with it ; on thorax the dots are on i. a, i. b, and a dot before.

Stage IV.—As in the next stage, but without a dot before the spiracle ; width of head 2.0 mm.

Stage V.—Head testaceous green, small ; width 2.5 mm. Thorax no longer thickened, but joint 12 sharply humped, descending perpendicularly to the anal feet. Subtranslucent velvety green, frosted whitish subventrally, dorsal vessel darker green. A moderately broad, diffuse, rather faint white stigmatal line, faint at the ends. Tubercles i. and ii. and a dot before ii. distinct, pale yellow, with dark green rims ; iv. to vi. and a dot before spiracle white. Tubercle iv. is opposite the upper edge of the spiracle, except on joint 12, where it is below the lower edge. At the end of the stage the larva turned black, all the tubercles and dots yellow, and spun a rather firm cocoon on a piece of bark. Imago in thirty days.

This larva apparently omitted the normal fourth stage. In the last stage, also, the head is smaller than would be expected ; but the moth that emerged was a rather small male.

Food plant.—Cat briar (*Smilax rotundifolia*).

CHLORIPPE CELTIS (BOISD.-LEC.) CAPTURED ON MONTREAL ISLAND.

BY CHARLES STEVENSON, MONTREAL.

On the 21st July, Mr. E. Denny, who often accompanies me on my entomological rambles, brought me a cyanide bottle full of butterflies which he had collected for amusement's sake. On looking at it I immediately saw a specimen that was new to me, and was congratulating myself on getting what I thought would be a new addition to the *Satyrinae* of my collection. My pleasure was increased, on consulting Dr. Holland's "Butterfly Book," to find it was a *Chlorippe celtis*, Boisd.-Lec., ♀, or Hackberry butterfly. (Plate XXIII., fig. 4.) A species, he states, as found generally from southern Pennsylvania, Ohio, Indiana, and Illinois, to the Gulf of Mexico. I immediately called my friend's attention to the specimen, and he remembered the particular place he had found it, because he thought at the time it was something he had not seen in my collection. So ever since we have watched the locality, but have not been successful in obtaining another. It was caught in the Outremont

district, just outside the city limits of Montreal. The only explanation I can find for its appearance is that it may have been imported in the chrysalid stage among some plants by some florist, as there are several nurseries in the neighborhood. The prevailing winds at the time would not favour migration.

A NEW NOCTUID OF THE GENUS CIRROPHANUS.

BY T. D. A. COCKERELL, N. M. AGR. COLLEGE.

Cirrophanus Dyari, n. sp.—♀. Expanse 34 millim. General colour and markings just as in *C. triangulifer*, Grote, except as regards the following particulars: The general colour is more ochreous—not so orange; the t. p. line curves inwards to a point not far from the middle of the wing, whence it rapidly bends outwards for a short distance, after which it again bends downwards and inwards to the inferior margin; the s. t. line is further from the margin, and deeply shaded about the middle with ochreous; the oblique dark line from the lower part of the t. p. line to the costa is distinct, and has a sharp zigzag near its middle. It results from the direction of the t. p. line that the light patch at the anal angle is more extensive than in *C. triangulifer*, but it is broken by a dark shade representing the lower part of the s. t. line. Hind wings strongly suffused with gray, with a curved gray line crossing the middle. Thoracic tufts deep brownish-orange. On the under side the primaries, except their margins, are strongly shaded with blackish.

Fore tibiae with a spine. Frontal tubercle well developed, with a semilunar hollow above it, surrounded by a strong rim.

Hab.—Fillmore Canon, Organ Mts., New Mexico, Aug. 28 (Ckll.). This was recognized as a distinct species by Dr. H. G. Dyar, but though I urged him to describe it, he would not. It is very different from *C. duplicatus*, Smith, but closely allied to *C. triangulifer*, from which it differs at once in the position of the notch in the t. p. line. The females of *triangulifer* in the National Museum have the hind wings without any dusky shade or lines; but Grote (Ill. Essay) figures a specimen with dusky hind wings, but with the s. t. line much nearer the margin than in *Dyari*.

The frontal tubercle of *Dyari* is perhaps a little less prominent than in *triangulifer*, but there is no noteworthy difference. The ♂ of *triangulifer* has the frontal tubercle much more produced and the hind wings less rounded than the ♀.

The type of *Dyari* is in the U. S. National Museum.

LIFE HISTORY OF HYPsorOPHA HORMOS, HÜBN.

BY HARRISON G. DYAR, WASHINGTON, D. C.

H. hormos is not uncommon on the persimmon in Alexandria County, Virginia. The species is double-brooded.

Egg.—Less than hemispherical, domed; ribbed with about 48 ribs around the margin, rather low, distinct, diminishing by confluence in pairs toward vertex, very slightly waved. Cross striæ faint lines crossing the hollows, scarcely indicated on the ribs. Micropyle somewhat broadly finely rounded reticular, not ridged. Diameter .6 mm.

Stage I.—Head rounded, slightly bilobed, colourless, ocelli black; width about .4 mm. Body slender, colourless transparent, food green; feet on joints 7 and 8 rudimentary, not used, larva a semi-looper. Shields scarcely cornified, faintly brown; tubercles distinct, pale, dark bordered; setæ short, stiff, white, i. and ii. in a square. Segments moniliform, incisures well marked, the segments not very strongly 3-annulate. Setæ primary.

Stage II.—Head small, slightly bilobed, whitish, dull; width .6 mm. Body slender, translucent green, food dark green; feet normal, small on joints 7 and 8, but little smaller than those on joints 9 and 10; anal feet projecting backward. No marks; tubercles obscure, setæ minute, i. and ii. faintly whitish.

Stage III.—The same; no perceptible marks; width of head .9 mm.

Stage IV.—Head 1.3 mm. Tubercles i. and ii. and the segmental folds distinctly whitish; no other marks as yet. Another example came out brown spotted at this stage. On the head, a dot on the vertex and at tubercle i.; a dash on each side of the cervical shield; an addorsal blotch on joint 4, and a dot on joint 3; a spot below tubercle i. on joints 5, 6, 7, 8, 10, 11 and 13; a large patch across dorsum on joints 9 and 12 anteriorly; some small dots on the sides and on joint 13 posteriorly.

Stage V.—Head as high as joint 2, scarcely bilobed, pale green, not shining, antennæ and mouth whitish; ocelli pale, in part black; width 1.8 mm. Body a little flattened, feet small, those of joints 7 and 8 slenderer than the others, those of joint 13 projecting backward. Translucent green, incisures folded, whitish, tubercles i. and ii. and the faintest trace of a subdorsal line in a few scattered dots yellowish-white; tubercles iii., iv. and v. and a few dots about the tracheal line also slightly pigmented. Ramifications of tracheæ visible. Tubercle iv. of joint 5 at the upper corner of spiracle, of joints 6 to 9 at the lower corner, of 10 below the middle, of 11 nearly in line with tubercle v., of 12 at the middle.

Stage VI.—Head 2.2 mm. Much as before, but more opaque, the skin whitish-green, the dorsal vessel dark and plainly pulsating. Marks as before, the skin finely peppered with white granules; spiracles reddish. Feet about equal, all with broad claspers, but short.

The brown-spotted form occurs also in this stage and in stage V.

Cocoon a small, compact, fairly tough web covered with bits of leaves, bark or other material.

Pupa.—Light brown, smooth, slightly shining; no cremaster, the anal segment slightly bulging and with two short spines above and eight below in a transverse row. The spines resemble setæ and arise from small tubercles. Surface slightly shagreened, no punctures. A series of fine waved lines about the first three spiracles. Length 12 mm.; width 3.5 mm.

THE DIPHYLISM OF THE DIURNAL LEPIDOPTERA.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

Having brought my studies of the neururation of the diurnals to a preliminary close, I wish to place on record here the conclusions to which they have led. The diphyly is founded on the following characters:

A.—Butterflies having a short third anal vein on fore wings, curving downwardly from base to internal margin, and with only one anal vein on hind wings..... *Papilionides*.

B.—Butterflies having a fork to the second anal vein of fore wings at base, sometimes incomplete, often disappearing through absorption, and with at least two anal veins on hind wings..... *Hesperiades*.

The nomenclature of the veins is unsettled. The submedian fold, usually obsolete, is numbered by Comstock, VI.; this would be the first anal vein. Comstock's vein VII. would be the second anal vein, and the curved and shortened vein which follows in the *Papilionides* would be the third. This vein is replaced in the *Hesperiades* by a short vein anastomosing above with the second anal vein (VII.), thus running in an opposite direction to the third anal of the *Papilionides*. This points to a different origin for the two groups. The fork of the *Hesperiades* has faded out in the *Satyrids* and most *Nymphalids*. It is persistent in the other families, with few exceptions in certain genera, e. g., *Leucophasia*.

The rejection of Mr. Scudder's classification of the diurnals is based on the following grounds: The sequence in specialization of the anal

veins is 3 : 2 : 1, the latter shown by the younger forms, as evidenced by Saturniades, in which the more specialized *Attacinae* have only one anal vein left on the hind wings. It is impossible to consider the Papilionides, with only one anal vein in hind wings, as representing in any way a primitive form of any of the Hesperiates. The reverse is, from this point of view, a possibility, although rendered improbable by the different type of neururation shown by the fore wings.

I conclude that a linear sequence of the diurnals, in a catalogue or otherwise, should begin with the Papilionides. The neururation of the Hesperiates offers no objection to a connection with the Agaristid-Noctuid stem of Dr. Dyar's Bombycides. The neururation of the Papilionides offers such weighty objections as to render the connection unlikely in the extreme.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS,
U. S. NATIONAL MUSEUM.

(Paper No. 5.)

FAMILY XX.—Philanthidæ.

The wasps belonging in this family have a peculiar habitus quite their own. The head is *always wider than the thorax*, the front wings have three cubital cells, while the abdomen, in nearly all the species, has usually a strong constriction between the first and second segments, the first segment being most frequently much narrowed. In only a single genus, *Trachypus*, Klug., is the abdomen distinctly petiolated. The eyes are large and normal, but occasionally exhibit a slight emargination within, and, more rarely, with a distinct emargination, or reniform as in *Trypoxylon* and *Pison*. Most of the species have the abdomen strongly punctured or punctate, and have also a constriction between all the abdominal sutures, although some also have the abdomen smooth and polished, and are without a constriction at the sutures.

All of the wasps in this family are predaceous, the majority of them provisioning their nests with beetles, *Curculionidæ*, *Buprestidæ*, etc., although a few prey upon the bees, *Halictus*, *Andrena*, etc.

The family is dividable into two distinct groups, which I call sub-families, distinguishable as follows :

Table of Subfamilies.

Hind femora more or less thickened at apex, and squarely truncate and produced beneath; cubitus in hind wings originating at a considerable distance *beyond* the transverse median nervure; metanotum with a well-defined triangular area at

base.....Subfamily I., Cercerinæ.

Hind femora not much thickened at apex, and neither squarely truncate nor produced beneath; cubitus in hind wings most frequently *interstitial*, or originating *before* the transverse median nervure, very rarely originating slightly beyond it; metanotum most frequently *without* a well-defined triangular area at

base.....Subfamily II., Philanthinæ.

SUBFAMILY I.—Cercerinæ.

This subfamily is readily recognized by the shape of the hind femora, *which are always thickened and squarely truncate at apex, and produced into a process beneath*, and also by the venation of the hind wings, the cubitus always originating some distance beyond the transverse median nervure.

Only four genera are known, all predaceous on beetles, and distinguished as follows:

Table of Genera.

- | | |
|--|----|
| Second cubital cell petiolate | 3. |
| Second cubital cell <i>not</i> petiolate | 2. |
2. Dorsal abdominal segments 2-4 with a median transverse furrow or impression.
- Third cubital cell quadrate, the third transverse cubitus uniting with the marginal cell at apex; lateral carinæ of the pygidium terminating in a tooth. ♂.....Eucerceris, Cresson.
- Third cubital cell not quadrate, the third transverse cubitus oblique, uniting with the marginal cell much before its apex; lateral carinæ of the pygidium in ♂ *not* terminating in a tooth.....Nectanebus, Spinola.
3. Third cubital cell quadrate, the third transverse cubitus joining the marginal cell at apex; dorsal abdominal segments 2-6 with a median transverse furrow or impression. ♀...Eucerceris, Cresson.
- Third cubital cell not quadrate, the third transverse cubitus oblique, joining the marginal cell much before the apex; dorsal abdominal segments 2-6 without a median transverse furrow or impression, but usually margined at apex.

First abdominal segment alone much narrowed, not longer than wide, and nearly as wide as the base of second, unarmed beneath ; ventral segments 3-5 usually with a transverse grooved line. *Cerceris*, Latreille.

First and second abdominal segments narrowed, the first longer than wide, the second subpyriform, the two united resembling the head and neck of a bottle, and both armed beneath with a tooth or thornlike process. *Didesmus*, Dahlbom.

SUBFAMILY II.—Philanthidæ.

This group is distinguished from the preceding by the normally shaped femora, and by the venation of the hind wings, the cubitus being interstitial with the transverse median nervure, or originating a little before it, but *never originating very far beyond it*.

The species falling in this subfamily also seem to have quite different habits, for whereas those of the former prey upon beetles, those in this group, so far as have been observed, prey only upon bees, *Apis*, *Halictus*, *Andrena*, etc.

Nine genera have been recognized, distinguishable by characters made use of in the following table :

Table of Genera.

- Eyes not at all emarginate within ; marginal cell at apex more or less distant from the costal margin, or subtruncate, *with* a slight appendage. 2.
- Eyes with a more or less distinct emargination within ; marginal cell at apex attaining the costal margin, *without* an appendage. 4.
2. Front wings with the second discoidal cell less than twice as long as wide at apex, the median and submedian cells equal or nearly . . . 3.
- Front wings with the second discoidal cell fully twice as long as wide at apex, or even longer.
- Third cubital cell, along the cubitus, about twice as long as along the radius ; pygidium in ♀ quadrangular, concave above, the clypeus margined anteriorly, but not dentate ; ♂ *with* the pygidium triangular, the clypeus anteriorly 3-dentate. *Clypeodon*, Patton.
- Third cubital cell, along the cubitus, usually more than twice as long as along the radius, sometimes thrice as long ; pygidium in ♀ triangular, *not* concave above, either flat or subconvex, the clypeus 3 to 5 dentate ; ♂ with the pygidium most frequently semicircular, or rarely obtusely triangular. *Aphilanthops*, Patton.

3. Cubitus in hind wings interstitial with the transverse median nervure ; marginal cell in front wings short, scarcely as long as the stigma, the second cubital cell triangular Eremiasphesium, Kohl.
 Cubitus in hind wings originating before the transverse median nervure ; marginal cell in front wings not short, the second cubital cell trapezoidal..... Philoponus, Kohl.
4. Abdomen *longly* petiolate, the petiole nearly of a uniform thickness throughout ; eyes deeply emarginate within..... 7.

Abdomen *not* petiolate, sessile.

- Eyes deeply emarginate within ; cubitus in hind wings variable, most frequently interstitial, or nearly, with the transverse median nervure ; abdomen smooth, polished, or at most sparsely or microscopically punctate..... 6.
- Eyes with only a slight indication of an emargination, or at least never deeply emarginate within ; cubitus in hind wings most frequently originating a little before the transverse median nervure ; abdomen distinctly punctate, often strongly rugoso-punctate 5.
5. Submedian cell in front wings fully as long as the median ; third cubital cell, along the radius, not longer than the second ; abdomen finely, closely, uniformly punctured, the segments, except the first, not constricted at the sutures..... Epiphilanthus, Ashm., n. g.
 (Type *P. solivagus*, Say.)

Submedian cell in front wings a little shorter than the median ; third cubital cell, along the radius, longer than the second ; abdomen usually strongly, coarsely and irregularly punctured, the segments mostly distinctly constricted at the sutures.

Clypeus margined anteriorly, with a pencil of long hairs on each lateral angle ; first recurrent nervure received by the second cubital cell before the middle ; first transverse cubitus strongly angulated at basal third ; ♂ with the last joint of the antennæ much compressed, broadened... Pseudanthophilus, Ashm., n. g.
 (Type *P. ventilabris*, Fabr.)

Clypeus not margined anteriorly, and usually, but not always, without the pencil of long hairs laterally ; first recurrent nervure received by the second cubital cell at or near the middle ; first transverse cubitus straight or slightly sinuate, but rarely distinctly angulated ; ♂ with the last joint of antennæ normal, not compressed..... Anthophilus, Dahlb.
 (Type *P. politus*, Say.)

C. verticalis, Smith, ♀.
C. vicina, Cr., ♀.
C. Robertsonii, Fox.
C. austrina, Fox.
C. acanthophilus, Ckll.
C. aequalis, Prov.
C. simulans, Sauss., ♂.
C. Montezuma, Cam., ♀.
C. tolteca, Sauss., ♀ ♂.
C. strigosa, Cam., ♀.
C. Maximiliani, Sauss., ♀.
C. aureofascialis, Cam.
C. geniculata, Cam., ♀.
C. feralis, Cam., ♂.
C. Chiriquensis, Cam., ♀.
C. flavomaculata, Cam., ♀.
C. otomia, Sauss., ♀ ♂.
C. flavida, Cam., ♀ ♂.
C. marginata, Cam., ♀.
C. mexicana, Sauss., ♀ ♂.
C. haustecæ, Sauss., ♀.
C. semipetiolata, Sauss., ♀ ♂.
C. zapotica, Sauss., ♂.
C. obsoleta, Cam., ♀.
C. montivaga, Cam., ♀.
C. Smithiana, Cam., ♀.
C. subpetiolata, Sauss., ♀.
C. truncata, Cam., ♀ ♂.
C. imperialis, Sauss.
C. exsecta, Smith.
C. Esau, Schlett.
C. acolhua, Sauss., ♂.
C. curvicornis, Cam., ♂.
C. hebes, Cam., ♂.
C. azteca, Sauss., ♀.
C. tepaneca, Sauss., ♂.
C. erythropoda, Cam., ♀.

C. rostrata, Smith.
C. bothriophora, Schlett.
C. chrysogastra, Schlett.
C. trichiosoma, Cam., ♂.
C. pilosa, Cam., ♂.
C. scapularis, Schlett.
C. thermophila, Schlett.
C. graphica, Smith, ♀.
C. sonorensis, Cam., ♂.

DIDESMUS, Dahlbom.

D. binodis, Spin., ♀ ♂.

Subfamily II.—*Philanthinae*

CLYPEODON, Patton.

C. quadrinotatus, Ashm., ♀.
C. concinnulus, Ckll.
C. anglesius, Ashm.

APHILANTHOPS, Patton

A. Elsiæ, Dunn.
A. frigidus, Smith.
A. subfrigidus, Dunn.
A. taurulus, Ckll.
A. Coquilletti, Ashm.
A. hispidus, Fox.
A. Utahensis, Bak.
A. laticinctus, Cr.
A. Bakeri, Dunn.
A. Foxii, Ashm.
A. nevadensis, Cr. (*Philanthus*).
A. marginipennis, Cam., ♂.
A. punctifrons, Cam., ♀.

EREMIASPECIUM, Kohl.

PHILOPONUS, Kohl,

EPIPHILANTHUS, Ashmead.

(1) *E. solivagus*, Say.

(2) *E. Sandbornii*, Cr.

PSEUDANTHOPHILUS, Ashmead.

(1) *P. ventralis*, Fabr.

| | |
|--------------------------------------|----------------------------------|
| ? <i>P. frontalis</i> , Cr. | <i>A. scelestus</i> , Cr. |
| ? <i>P. xanthostigma</i> , Cam., ♀. | <i>A. dubius</i> , Cr. |
| ? <i>P. maculifrons</i> , Cam., ♂. | <i>A. sublimis</i> , Cr. |
| ? <i>P. multimaculata</i> , Cam., ♂. | PHILANTHUS, Fabricius. |
| ANTHOPHILUS, Dahlbom. | <i>P. bilunatus</i> , Cr. |
| <i>A. politus</i> , Say. | TRACHYPUS, Klug. |
| <i>A. albifrons</i> , Cr. | <i>T. mexicanus</i> , Sauss. |
| <i>A. flavifrons</i> , Cr. | <i>T. punctifrons</i> , Cam., ♂. |
| <i>A. pacificus</i> , Cr. | <i>T. hirticeps</i> , Cam., ♂. |
| <i>A. albopilosus</i> , Cr. | <i>T. gracilis</i> , Cam., ♂. |

FAMILY XXI.—Trypoxylidæ.

This family has usually been classified with the family *Crabronidæ*, with which it has no affinity whatever, its affinities being closest to the *Larridæ*, through *Pison*, and to the *Philanthidæ* through *Trachypus*; but is readily separated from both by the characters made use of in my table of families.

Trypoxylon, the type of the family, was probably classified, by the older entomologists, with the *Crabronidæ* on account of its elongate, narrow form, and its petiolate, clavate abdomen, which gives it a superficial resemblance to the *Crabronid* genus *Rhopalum*. Structurally, however, it has no relations whatever with this or allied genera, differing widely in the structure of the head and in the venation of both pairs of wings.

Only two genera are known, separable as follows:

Table of Genera.

Front wings with two cubital cells, the second usually indistinctly defined; eyes deeply emarginate within.

Median and submedian cells in front wings of an equal length, the transverse median nervure being interstitial with the basal nervure; first recurrent nervure interstitial with the first transverse cubitus or nearly, the second recurrent received by the second cubital cell before the middle. *Aulacophilus*, Smith.

Median cell in front wings distinctly longer than the submedian, the transverse median nervure joining the median vein *before* the origin of the basal nervure; first recurrent nervure uniting with the cubitus before the first transverse cubitus; second recurrent nervure rarely distinctly defined, usually indicated by a fuscous line or streak. *Trypoxylon*, Latreille.

North American Species.

| | |
|---------------------------|-----------------------------|
| AULACOPHILUS, Smith. | T. striatum, Prov. |
| TRYPOXYLON, Latreille. | T. sulcus, La Munyon. |
| T. politum, Say. | T. unicolor, Beauv. |
| =albitarse, Auct. | T. centrale, Cam. |
| =neglectum, Kohl. | T. cinereum, Cam. |
| T. albipilosum, Fox. | T. mexicanum, Sauss. |
| T. excavatum, Say. | T. aztecum, Sauss. |
| T. projectum, Fox. | T. lactitarse, Sauss. |
| T. apicalis, Fox. | T. luteitarse, Sauss. |
| T. frigidum, Smith. | T. carinifrons, Cam. |
| T. bidentatum, Fox. | T. fulvispina, Cam. |
| T. rubricinctum, Pack. | T. fulvipes, Cam. |
| T. rufozonalis, Fox. | T. balteatum, Cam., ♀. |
| T. arizonense, Fox. | T. apicipenne, Cam. |
| T. californicum, Sauss. | T. cinereo-hirtum, Cam., ♀. |
| T. spinosum, Cam., ♀ ♂. | T. fasciventre, Cam., ♀. |
| T. texense, Sauss. | T. sonorensis, Cam. |
| T. collinum, Smith. | T. cornigerum, Cam. |
| T. carinatum, Say. | T. chichimecum, Sauss. |
| T. Johnsonii, Fox. | T. toltecum, Sauss. |
| T. ornatipes, Fox. | T. palliditarse, Cam. |
| T. fastigium, Fox. | T. rugifrons, Cam. |
| T. pennsylvanicum, Sauss. | |

FAMILY XXII.—Mellinidæ.

This family, as well as those which are to follow, is distinguished from all of the preceding families by *having two apical spurs on the middle tibiae*. From the other families having this character in common, namely, the Nyssonidæ, Stizidæ, Sphegidæ, and Ampulicidæ, it could only be confused with the family Nyssonidæ, subfamily Gorytinæ.

Unquestionably, the Mellinidæ and the Nyssonidæ have had a common origin and are exceedingly closely allied, but I believe both exhibit certain structural peculiarities, of taxonomic value, that justify one in keeping them separate and in treating them as distinct families.

In the Mellinidæ the first abdominal segment is usually long, petioliform, and coarctate, *or always with a decided constriction between the first and second segments*, the intermediate coxæ are contiguous, while the mesosternal suture is usually entirely wanting. In the Nyssonidæ, on the

contrary, the first abdominal segment may be long, but it is never coarctate, and there is never a constriction between it and the second segment, the middle coxæ are not quite so close together, and, as a rule, the *mesosternal suture is distinct or represented by a strong carina which separates the mesosternum from the mesopleura*. If this last character is not present, other quite distinct characters separate them.

The genera falling in this family may be distinguished by the use of the following table :

Table of Genera.

- | | |
|--|--|
| Cubitus in hind wings originating <i>beyond</i> the transverse median nervure..... | 5. |
| Cubitus in hind wings <i>interstitial</i> with the transverse median nervure..... | 4. |
| Cubitus in hind wings originating <i>before</i> the transverse median nervure. | |
| Front wings with the second cubital cell receiving both recurrent nervures | 2. |
| Front wings with the first and third cubital cells each receiving a recurrent nervure; submedian cell a little shorter than the median..... | Mellinus, Fabr. |
| 2. Submedian cell a little longer than the median..... | 3. |
| Submedian and median cells equal, the transverse median nervure <i>interstitial</i> with the basal nervure, stigma not well developed, the radius originating from its apex..... | Harpactostigma, Ashm., n. g. (Type H. velutinus, Spin.) |
| 3. Stigma well developed, rounded off at apex, the radius originating before its apex or near the middle, eyes very large, strongly convergent anteriorly on the clypeus. | |
| First recurrent nervure received by the second cubital cell at its middle; abdomen with the dorsal segments depressed at apex..... | Entomosericus, Dahlb. |
| First recurrent nervure received by the second cubital cell before the middle; abdomen with the dorsal segments not depressed at apex, normal..... | Megalomma, Smith. |
| 4. Stigma only moderately developed, the radius originating from its apex; submedian cell a little longer than the median; second cubital cell receiving both recurrent nervures; triangular area of metathorax well defined, striated; scutellum with a crenulate furrow across the base..... | Hypomellinus, Ashm., n. g. (Type G. rufocinctus, Fox.) |

5. Front wings with the second cubital cell receiving both recurrent nervures 6.
 Front wings with the first and second cubital cells each receiving a recurrent nervure, or the first recurrent is interstitial with the first transverse cubitus; stigma well developed, the radius originating from its middle; median and submedian cells equal, the transverse median nervure interstitial with the basal; tibiae stout, clavate, spinous, the inner spur of hind tibiae dilated. . . . Euspongius, Lepel.
 6. Submedian and median cells equal; stigma large or well developed, the radius originating before its apex; hind tibiae short, stout, spinous, the tarsi of normal length. Olgia, Radz.
 Submedian cell a little longer than the median; stigma not well developed, the radius originating from its apex; ♀ with a distinct tarsal comb; hind legs long, their tarsi fully twice as long as the tibiae.

Head with the eyes not convergent on the clypeus, but convergent posteriorly; abdomen not or scarcely longer than the head and thorax united, the first segment strongly coarctate, dorsal segments *without* white pubescent bands at

apex. Mellinogastra, Ashm., n. g.
 (Type *G. mellinoides*, Fox.)

Head with the eyes convergent on the clypeus, divergent posteriorly; abdomen longer than the head and thorax united, the first segment long, petioliform, subcoarctate, the dorsal segments banded with a whitish pubescence at

apex. Hapalomellinus, Ashm., n. g.
 (Type *G. eximius*, Prov.)

North American Species.

- | | |
|---|--|
| (1) MELLINUS, Fabr. | (1) <i>H. rufocinctus</i> , Fox, ♀. |
| (1) <i>M. abdominalis</i> , Cr., ♀ ♂. | (2) (?) <i>H. piceus</i> , Hdl., ♂. |
| (2) <i>M. bimaculatus</i> , Pack., ♀ ♂. | (6) EUSPONGUS, Lepeletier. |
| (3) <i>M. rufinodus</i> , Cr., ♀ ♂. | (1) <i>E. bipunctatus</i> , Say., ♀ ♂. |
| (4) <i>M. pygmaeus</i> , Handl., ♀ ♂. | (2) <i>E. Championi</i> , Cam., ♀. |
| (5) <i>M. alpestris</i> , Cam., ♀. | (7) OLGIA, Radoszkowski. |
| (6) <i>M. obscurus</i> , Hdl., ♀. | (8) MELLINOASTRA, Ashmead. |
| (2) HARFACTOSTIGMA, Ashmead. | (1) <i>M. mellinoides</i> , Fox, ♀. |
| (3) ENTOMOSERICUS, Dahlbom. | (9) HAPALOMELLINUS, Ashmead. |
| (4) MEGALOMMA, Smith. | (1) <i>H. eximius</i> , Prov., ♀ ♂. |
| (5) HYPOMELLINUS, Ashmead. | |

A NEW SPECIES OF TINGITIDÆ.

BY OTTO HEIDEMANN, U. S. DEPT. OF AGRICULTURE, WASHINGTON, D. C.

Among the interesting species of Heteroptera which have been sent to the Division of Entomology by correspondents during the present season was a species of Tingitidæ which has not hitherto been described. In accordance with an established custom of the U. S. Department of Agriculture, the following description is submitted for publication in a periodical journal in preference to publishing it in a Departmental bulletin.

Gargaphia angulata, n. sp.

Oblong, narrower than other species of the genus *Gargaphia*, yellowish-white, translucent; body black beneath; posterior part of the rostral groove at the metasternum transverse. Head black, with three white, short but rather thick, obtuse spines in front between the antennæ. Antennæ slender, finely ciliated, testaceous, apical joint blackish; basal joint nearly twice as long as joint two; joint three very long, about four times as long as the apical. Pronotum dark, with three carinæ; the interspaces closely and finely punctate; the carinæ moderately foliaceous, testaceous, the median carina posteriorly whitish, tapering toward the apex of the reticulated membranous triangular portion of the pronotum; the membranous pronotal margin raised and moderately wide, angularly dilated behind the middle, with two rows of areoles at the narrow portion and with three areoles at the widest part, the areoles infuscated; pronotal hood small, oblong, somewhat compressed, with a sharp carina at the top, slightly projecting in front, leaving the eyes free; the hood, the three carinæ and the edge of the pronotal margin densely fringed with long, soft hairs. Hemelytra extending far beyond the abdomen, oblong-oval, broadly rounded at the apex, the sides abruptly converging to the base; subcostal and discoidal areas closely reticulated, the subcostal biseriate, the discoidal area comparatively narrow and not reaching the middle of the hemelytra, with three series of areoles at the widest part; the costal area rather broad, the areoles of irregular size, more or less hexagonal, except those along the exterior margin, which are either pentagonal or quadrate; the sutural area, but not the inner basal portion of it, has a few quite large areoles; three or four oblique blackish nervures at the costal area, and also some slightly darkened nervures at the apex of the hemelytra. Legs testaceous, with the tarsi blackish at the tip. On the rounded oval external genital plate of the male there is on both sides near the base a deep sunken point, the claspers at the apex are stout and hairy. Length, 3.4; width, 1.6 millim.

Described from several specimens found at Auburn, Ala., and District of Columbia (Heidemann). Type, No. 4371, U. S. Nat. Museum, from Auburn, Ala. A single specimen, probably from Missouri, and preserved in the collection of the U. S. Nat. Museum, is labeled in Prof. Uhler's handwriting: "*Tingis angulata*, Uhler, MS, on beans, Riley." I gladly accept Prof. Uhler's manuscript name.

This species is closely allied to *G. viridescens*, Champ., from Mexico and Texas, but differs by the angulated sides of the pronotum, by the larger number of areoles at the costal area, and the longer hairs at the edge of the pronotal margins and of the hood. It is also allied to *G. nigrinervis*, Stal., from Colombia and Mexico, but does not have the discoidal area of the hemelytra abruptly closed behind by a transverse oblique raised nervure.

BOOK NOTICES.

INSECTS: THEIR STRUCTURE AND LIFE—A Primer of Entomology.—By George H. Carpenter. London: J. M. Dent & Co. New York: The Macmillan Co., 66 Fifth Avenue. (Price, \$1.75.) 404 pages.

This is a very satisfactory manual for the elementary study of entomology, and provides the student with all that he needs at first to know regarding the structure and general life-history of insects. The book is almost entirely a compilation from a large number of more elaborate and highly technical works, such as Dr. Packard's recent Text-book, Professors Miall & Denny's monograph on the Cockroach, and many others, but it is admirably put together and written in an easy and agreeable style. Its careful perusal will give the reader an excellent ground work for the pursuit of entomology, whether he proposes to apply himself to economic investigation or systematic study, or simply to the formation of a collection of insects. The book is divided into half a dozen chapters, the titles of which will give a good general idea of its contents, viz.: The Form of Insects, the Life-history, the Classification, the Orders, the Pedigree of Insects and their Surroundings. The illustrations, nearly two hundred in number, are very largely those with which we are familiar, the work of Dr. Riley and members of the staff of the Division of Entomology at Washington; others are from Miall & Denny's "Cockroach," and several English publications. They are a great help in elucidating the text, being well chosen for their clearness and excellence. The book may

very well be studied by college students and others taking a course in entomology; it will be found much simpler and easier to work through than Dr. Packard's larger and more elaborate treatise, but it will not be found of any use in the classification and identification of specimens, like Prof. Comstock's Manual, as this is not its object. Throughout the whole, it may be mentioned, the reader will observe its author's evidently strong views on the theory of evolution.

NEW SPECIES OF LEPIDOPTERA.

Mr. Herman Strecker has recently published the second part of the Supplement to his "Lepidoptera: Rhopaloceres and Heteroceres, indigenous and exotic." It contains descriptions of three new species of butterflies and fifty moths; the former and a few of the moths are from regions outside the faunal limits of the United States and Canada. Two species are distinctively Canadian: *Therina fatuaria* from Montreal and *Ochyria Anticostiata* from the island of Anticosti. These Supplements will be quite as necessary to the student of Lepidoptera as the original work. They may be obtained from the author, P. O. Box 311, Reading, Penna. (Price, 25 cents each.)

FLASHLIGHTS ON NATURE.—By Grant Allen; illustrated by Frederick Enock. Toronto: William Briggs, 29 Richmond Street West. (Price, 70 cents.) 312 pages.

Mr. Grant Allen's versatility as a writer is well known, but whatever opinion may be formed regarding his novels and tales of fiction, there can be no question that few authors can be compared with him when he devotes himself to natural-history subjects. His papers show that he must be a most minute and painstaking student of the wonders of plant and animal life, while at the same time his literary skill enables him to describe what he has seen and studied in a most charming manner and without any loss of scientific precision. He has also the able assistance of Mr. Enock, who is a well-known entomologist, and who evidently aids the author not only with his beautiful drawings, but with his careful observations as well. Most, if not all, of the papers in the volume before us have already appeared in the pages of a widely-circulated magazine, but they are well worthy of reproduction in this more permanent and convenient form. They treat of insects, birds, and plants, under such titles as the Cows that Ants Milk, a Plant that Melts Ice, a Beast of Prey

(Spider), a Woodland Tragedy (doings of a Butcher bird), Marriage Among the Clovers, the First Papermaker, etc. The closing paper, a Foreign Invasion of England, gives an admirable description of the life-history of the Hessian Fly. The illustrations, about a hundred and fifty in number, are very beautiful, and in clearness and excellence leave nothing to be desired. Anyone with a genuine love of nature cannot fail to be delighted with the book, and to derive from its perusal a knowledge of many things that were secrets to him before.

CORRESPONDENCE.

DERMESTES LARDARIUS (LINN.) IN HONEYCOMB.

In Dr. Lintner's Sixth Report of the Injurious Insects of the State of New York, 1890, mention is made of the fact that *Dermestes lardarius* was a wax-feeder. The only other reference to this habit of the insect was made by Dr. C. V. Riley, in the second volume of the American Entomologist for 1870.

A few days ago, while Mr. Ross, Fellow in the Bacteriological Department, was overhauling some brood comb which had been sent him for studying *foul brood*, he came across several adult beetles, many hairy larvæ, and moult skins, which he referred to me for identification. They all belonged to *Dermestes lardarius*. There is not good evidence, however, that they were feeding upon wax; but rather upon the dead larvæ and pupæ of Bee Moths (*Galleria mellonella*) which had established themselves in the honeycomb. On opening several cocoons of the Bee Moth, I found that the larvæ of *Dermestes* had possession of the old pupa-cases. The cocoons were all placed at right-angles to the direction of the honeycomb cells. Many large larvæ of *Galleria* were still to be found, and their silk-lined tunnels in the honeycomb were quite in evidence. A third suggestion is that the larvæ of *Dermestes* may prey upon the larvæ of the bee. In this case, however, I am of the opinion that the dead pupæ and larvæ of the Bee Moth formed the chief portion of the food of *Dermestes*. W. LOCHHEAD, Biological Dept. Ont. Ag. Coll.

JUSTUS W. FOLSOM, of Cambridge, Mass., received the degree of Doctor of Science from Harvard University at the last commencement. His thesis was based upon anatomical and embryological work among the Collembola and Thysanura.

P. H. ROLFS has accepted a position at Clemson College and Experiment Station, and has accordingly changed his address from Lake City, Florida, to Clemson College P. O., South Carolina.

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No. 11.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The thirty-sixth annual meeting of the Society was held in London on the 11th and 12th of October. On the former day a very interesting and important conference and discussion took place in the afternoon, on the San José Scale, which was participated in by Prof. James, Deputy Minister of Agriculture; Dr. Fletcher, Dominion Entomologist and Botanist; Mr. J. Dearnness, one of the Special Commissioners on the Scale; Prof. Lochhead, Ontario Agricultural College; Prof. Webster, Wooster, Ohio; Mr. Fisher, Provincial Inspector; and others. A public meeting of a popular character was held in the evening, at which the President, Mr. Lyman, read his annual address, and Dr. Fletcher, Professors Webster and Lochhead, and the Rev. Drs. Fyles and Bethune took part. The second day was devoted to the general business of the Society and the reading and discussion of papers. A full account of the proceedings will be given in the annual report of the Society.

The following were elected officers for the ensuing year:—

President—Rev. T. W. Fyles, D. C. L., F. L. S., South Quebec.

Vice-President—Professor Wm. Lochhead, Ontario Agricultural College, Guelph.

Secretary—William E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors: Division No. 1—W. H. Harrington, F. R. S. C., Ottawa.

Division No. 2—J. D. Evans, Trenton.

Division No. 3—D. G. Cox, Toronto.

Division No. 4—James Johnson, Bartonville.

Division No. 5—R. W. Rennie, London.

Directors ex-officio (ex-Presidents of the Society).—Professor Wm. Saunders, LL. D., F. R. S. C., F. L. S., Director of the Experimental Farms, Ottawa; Rev. C. J. S. Bethune, M. A., D. C. L., F. R. S. C., London; James Fletcher, LL. D., F. R. S. C., F. L. S., Entomologist and Botanist, Experimental Farms, Ottawa; John Dearnness, I. P. S., London; Henry H. Lyman, M. A., Montreal.

Director ex-officio (Ontario Agricultural College).—Professor Wm. Lochhead, Guelph.

Librarian and Curator—J. Alston Moffat, London.

Auditors—J. H. Bowman and W. H. Hamilton, London.

Editor of the Canadian Entomologist—Rev. Dr. Bethune, London.

Editing Committee—Dr. J. Fletcher, Ottawa ; H. H. Lyman, Montreal ; J. D. Evans, Trenton ; W. H. Harrington, Ottawa ; Prof. Lochhead, Guelph.

Delegate to the Royal Society—Rev. Dr. Bethune, London.

Delegates to the Western Fair—J. Dearness and Dr. Bethune, London.

Committee on Field Days—Dr. Wolverton, Messrs. Balkwill, Bowman, Elliott, Law, Percival, Rennie, and Saunders, London.

Library and Rooms Committee—Messrs Balkwill, Bethune, Dearness, Moffat, and Saunders, London.

The following gentlemen were unanimously elected Honorary Members of the Society :

DR. L. O. HOWARD, United States Entomologist, Washington, D. C.
PROFESSOR JOHN B. SMITH, Sc. D., Rutgers College, New Brunswick, N. J.

PROFESSOR F. M. WEBSTER, Wooster Ohio.

PROFESSOR H. F. WICKHAM, Iowa City, Iowa.

SOME NEW DELTOCEPHALINÆ (JASSIDÆ).

BY E. D. BALL, FORT COLLINS, COLORADO.

Deltocephalus callidus, n. sp.

Form and general appearance of *signatifrons* nearly, more robust, venation slightly variable, resembling that of *compactus*. Length 3 mm.; width 1 mm.

Vertex obtusely angulate, one-sixth wider at base than its middle length, scarcely equalling the pronotum; front long and narrow, but slightly wider than clypeus below; pronotum more than twice wider than long; elytra equalling the abdomen, rather broad, outer claval area slightly reticulated, central anteapical cell usually divided.

Colour: pale creamy white, vertex with a triangular spot either side the apex, an interrupted bar before the ocelli and an ocellate spot on either side at the base, fuscous or black; pronotum irregularly marked with olive and fuscous; elytra with the nervures light, margined with

brownish fuscous, interrupted on a distinct band across the second cross-nervure and the first apical veinlet; below dark, the lower half of face light, with the sutures and a spot on the clypeus fuscous.

Genitalia: female, ultimate ventral segment convex, one-third longer than penultimate, posterior margins roundly emarginate from the acute lateral angles, produced on the middle third into a rounded process which is triangularly notched at the apex, lateral angles light, median process black.

Described from three female specimens from Pullman, Wash. (C. V. Piper).

Deltoccephalus ordinatus, n. sp.

Similar to *collinus* in form, but with a shorter vertex, vertex shorter than in *Melsheimeri*. Pale straw yellow with brownish olive markings. Length 3.5-4 mm; width 1.5 mm.

Brachypterous form: vertex slightly obtusely angulate, the margin blunt and rounding, one third longer on middle than against eye, as long as the pronotum, slightly wider than long; face as in *collinus*, front rather broad, lateral margins convex; pronotum broad, but slightly emarginate posteriorly; elytra broad and short, exposing the two last abdominal segments, apex evenly rounding from both sides, the apical cells very short; wings rudimentary.

Macropterous form; vertex longer, right-angled; elytra and wings exceeding the abdomen, apical cells long, the appendix present, central ante-apical cell long and parallel margined.

Colour: vertex with the lateral margins and a median stripe, widening posteriorly, pale straw yellow, the disc on either side brownish olive; pronotum with four brownish stripes; elytra pale subhyaline yellowish; more or less of the fuscous on the sides of the abdomen showing through; face pale olive with lighter arcs, below pale yellow.

Genitalia: female, ultimate ventral segment equalling the penultimate, posterior margin roundly emarginate for one-third the distance from the lateral angles, then produced into a pair of slightly divergent, acutely angular processes between which is a short rounding tooth.

Described from six females from Marshall's Pass and one from Ft. Collins, Colo., all taken by Prof. Gillette.

Deltoccephalus paludosus, n. sp.

Somewhat resembling *auratus*, but with the elytra flaring rather than compressed. Colour lemon yellow in female, greenish yellow in male.

Elytra with black spots either side of the apex. Length 3.5-4 mm; width 1 mm.

Vertex roundingly rectangular, the margins obtusely rounding, apex subconical, length and width about equal, shorter than the pronotum; pronotum twice wider than long, broadly produced between the eyes, posterior margin nearly straight; elytra equalling the abdomen in the female, slightly longer in the male; venation as in the female of *auratus*, the second cross nervure seldom present.

Colour: female pale lemon yellow, the eyes deep green or fuscous, a spot in the second apical and another in the anal cell, and sometimes a line around the apex fuscous; male greenish yellow, the face and vertex sometimes orange, eyes and a spot in each apical cell fuscous, those in the third and fourth coalescing into a line on the margin.

Genitalia: female; ultimate ventral segment equalling the penultimate, the lateral angles somewhat produced, between which the posterior margin is nearly truncate, a large median triangular notch, either side of which there is a black spot. Male: valve long, the apex rounding, plates as broad at the base as the ultimate segment, regularly narrowing to one-half that width at their truncate apices, width at base and length about equal, margins reflexed and armed with stout hairs, a fuscous spot on the tip of each plate and a small black one before it.

Described from twenty-five specimens taken from *Carex*, Ft. Collins, Colo.

Deltocephalus castoreus n. sp.

Short compact, with a short conical vertex. Black, with light markings on vertex and three subhyaline light bands on elytra. Length 2.5 mm; width 1 mm.

Vertex conical, obtusely angulate, equalling the pronotum, its basal width one-third greater than its length on middle, anterior margin roundingly narrowing to the broad convex front, which is roundingly narrowing below to the broad parallel margined clypeus; clypeus two-thirds the length of the front; elytra broad, evenly rounded behind, with a broad, short appendix, covering the abdomen in the male, a little shorter in the female; venation obscure except on the hyaline areas, clavus not reticulated, central anteapical cell short, not divided.

Colour: vertex shining black, a small circle around tip, connected with the ocelli by a slender line, and a broad irregular mark at base light yellow; pronotum black, with a tri-lobate yellow mark along the posterior

margin; scutellum black; elytra shining black with an indistinct light band extending from the point of the scutellum obliquely across the first cross-nervure of corium, another band from the apex of clavus transversely across the second cross-nervure, and a third along the apical margin; below shining black, the margins of the genæ and the spines on the posterior tibiæ orange.

Genitalia: female, ultimate ventral segment half longer than penultimate, posterior margin rounding, slightly excavated, with a small median tooth; male valve broad, triangular, the margins membranous except at the tip; plates as broad as the ultimate segment, slightly convexly narrowing two-thirds their length, then curved slightly upwards and extending into a broad finger, the whole three times the length of the valve, equalling the pygofer.

Described from one male and one female from the head waters of the Little Beaver (9,500 ft. alt.), Larimer Co., Colo.

Deltocephalus satur, n. sp.

Resembling *compactus*, smaller, scarcely larger than *blandus*, with a shorter vertex. Olive brown with light and fuscous markings. Length: ♀ 2.5 mm., ♂ 2 mm.; width 1 mm.

Macropterous form: vertex convex, sloping, narrowing posteriorly, where it equals the middle length, slightly shorter than pronotum, slightly obtusely angulate, the apex produced, conical; face convex, front large, lateral margins rounding, clypeus long and prominent; elytra slightly longer than abdomen in both sexes; venation similar to *compactus*, inner claval vein approaching the outer and connected by two cross-nervures, outer margin of clavus irregularly reticulated, central anteapical cell divided, the dividing nervure being beyond the apex of clavus. Brachypterous form: elytra short, obliquely truncate, exposing the ultimate and most of the penultimate dorsal segments, apical cells minute, posterior part of central anteapical minute or wanting.

Colour: vertex olive brownish, a light band between the ocelli, another along the anterior margin, these coalescing, omitting a triangular spot either side the apex and a fuscous one inside the ocellus on either side, an oblique fuscous dash on either side near the base; pronotum olive brown with a submarginal row of fuscous spots and subobsolete light stripes; elytra subhyaline, the nervures broadly light, irregularly, narrowly margined with fuscous, a spot on the centre of costa, the inner anteapical cell and the second apical, fuscous or black.

Genitalia: female, ultimate ventral segment nearly four times wider than long, posterior margin slightly emarginate with a short broad median tooth; male valve broad, short; plates broad at base, concavely, attenuately pointed, two and one-half times longer than valve, equalling the pygofers, which are thickly beset with stout hairs.

Described from two females and two males from Holly, Colo. The small size and the black spot near the anal angle of the elytra at once distinguish this species.

Lonatura salsura, n. sp.

Form and general appearance of *catalina*, but much larger. Pale sordid yellow. Length: ♀ 4.5 mm., ♂ 4 mm.; width 1.25 mm.

Macropterous form: vertex broad, obtuse, convex, one-half longer on middle than against eye, one-third wider than long, anterior margin rounding; front very broad above, rapidly roundly narrowing to the long parallel margined clypeus; pronotum one-fourth longer than the vertex, as wide as the eyes; elytra slightly longer than the abdomen in both sexes, broadly overlapping behind clavus, appendix well developed, nervures indistinct, veins on clavus connected, anteapical cells very long, parallel margined, their apices truncate.

Brachypterous form: as above except that the abdomen is elongate and the elytra very short, truncate, only covering the first abdominal segment, the exposed part being one-half the whole length of the insect.

Colour: pale sordid straw in the brachypterous form, macropterous form washed with brownish olive on the head and pronotum, tergum fuscous, partly visible through the hyaline elytra; below dark fuscous except the face. In dark specimens, there are a pair of spots at the apex and an oblique pair near the base of the vertex.

Genitalia: female, ultimate ventral segment slightly emarginate either side of a prominent median tooth, which is as long as its basal breadth, the lateral angles deeply excised, displaying a rounding lobe of a membrane beneath; male valve rounding, almost concealed by the ultimate segment, plates concavely acuminate, longer than ultimate segment, equalling the pygofers.

Described from numerous specimens collected at Ft. Collins and a few from Holly and the Little Beaver, Colo.

COLEOPTERA IN SEPTEMBER.

Stone-turning on the hillsides and in the woods, usually productive late in the season, gave very poor returns this year. However, on September 17th, a brother entomologist and the writer visited a locality which would satisfy the most exacting collector. Where the Chicopee River empties into the Connecticut, a depression in the low meadowland marks the course of a former branch of the river. The spot is well wooded with poplars, willows and maples, in whose dense shade

a rank undergrowth thrives. Early in the season a pool of water, left by the spring inundation, occupies the deeper part of the old watercourse, but disappears in the course of the summer. However, the ground remains moist and muddy throughout the season. Here we found beetles fairly swarming. Carabidæ and Staphylinidæ were running over the ground everywhere, and every bit of debris, hole and crevice sheltered them. Most of the specimens taken belonged to the two families mentioned, but several species of Scarabæidæ, Chrysomelidæ and weevils, driven to shelter by the early frosts, were also found. Carabidæ occurred in considerable variety, Bembidiums, of course, predominating. The species of this genus which most pleased us was the handsome *B. postremum*, which the writer had not seen alive for many years. It is a showy species with highly-polished green surface and a couple of light patches on the elytra. It runs most rapidly when alarmed, but does not take flight like so many others of its genus. On some circumscribed patches of ground it was quite numerous, and scampered out from nearly every bit of litter that was disturbed, or peeped from holes in the ground, while only a few paces away none were to be found. It seemed to prefer the places where the weeds were densest, while in more open spots the less conspicuous species, as *B. dorsale*, *B. variegatum*, *B. flavopictum*, etc., abounded. Running over the mud a few *Elaphrus ruscarius* were taken. Under debris a number of *Carabus vinctus* and a few of the pretty, though minute, *Dyschirius hæmorrhoidalis*. Perhaps the most abundant beetle was *Platynus anchomenoides*. It was found wherever the herbage was turned aside. In this connection may be mentioned this beetle's curious habit of feigning death when thrown on its back, although otherwise very lively. Occasionally an *Omophron* was found under a fallen leaf or bit of twig, and they increased in numbers as we approached the open ground lately occupied by the pool. Here they were found under debris and by digging just beneath the surface of the soil. The pressure from our feet, as we moved about, drove them from their burrows, and they could be seen emerging close to us, while several were generally in sight running over the ground. An old dust-broom, which happened to be at hand, gave excellent service at this juncture. By sweeping the ground and thus exposing the burrows, the beetles were taken literally by hundreds. This was highly satisfactory, as in my search of former years along sandy shores, I had found them very sparingly.

FREDERICK KNAB, Chicopee, Mass.

A LIST OF MANITOBA MOTHS.—PART IV.

BY A. W. HANHAM, WINNIPEG, MAN.

(Continued from page 206).

- Hadenella subjuncta*, Smith. A few at light in 1897 about the beginning of July. (See page 323, Vol. XXX.)
- Drybota stigmata*, Grt. Cartwright.
- Polia confragosa*, Morr. Sept. 15th (1896). Three specimens at sugar in Elm Park.
- Laphygma frugiperda*, S. & A. Sept. 8th, one at bloom.
- Eupsephopæctes procinctus*, Grt. Cartwright. I think Mr. Heath has only taken one of these fine insects.
- Trigonophora periculosa*, Gn. Cartwright.
- Brotolomia iris*, Gn. June 19th, etc., several at light, also taken resting on walls of house.
- Euplexia lucipara*, Linn. June 18th to middle of July, a few at light.
- Nephelodes minians*, Gn., and var. *violans*, Gn. Rather rare here apparently; taken at light and on the wing, August 21st to September 9th.
- Tricholita semiaperta*, Morr. Occasional at light towards the end of July.
- Helotropha reniformis*, Grt., and var. *atra*, Grt. A common moth at sugar from middle of August until middle of September.
- Hydroecia sera*, G. & R. Sept. 23rd (1897), one at light.
- “ *juvenilis*, Grt. A pair in July.
- Hydroecia atlantica*, Smith. A somewhat variable species and common. Taken at bloom, at light, and at sugar (rarely) from middle of July to the middle of September.
- Hydroecia interoceanica*,* Smith. Winnipeg.
- “ *verona*, Smith. Winnipeg.
- Hydroecia obliqua*, Harv. Rare at light, end of July (only one ♀ taken). Also at Brandon.
- Hydroecia cerina*, Grt. One at light on 21st September (1897).
- Hydroecia purpurifascia*, G. & R. Mr. Heath seems to have found this species not uncommon. I took one in Elm Park by beating dead leaves on bough, September 26th (1896).
- Hydroecia rutila*, Gn. Cartwright.
- “ *immanis*, Grote. Cartwright.

*Among the specimens of *nictitans*†, = *atlantica*, Sm., received from Mr. Hanham were three small, very dark specimens, without date or other label save “Winnipeg.” These proved distinct and were described in *Trans. Am. Ent. Soc.*, XXVI, 17, May, 1899. J. B. Smith.

Hydroecia frigida, Smith. One at light here on September 16th, also taken by Mr. Heath.

Hydroecia nelita, Streck. Cartwright.

Hydroecia appassionata, Harv. A beauty at light on September 22nd (1898).

Nonagria, sp. I have taken two specimens here at light, one August 31st (1897), the other August 14th (1898), and I have seen the same species from Brandon and Cartwright. (Prof. Smith says concerning *Nonagria*, that the species are absolutely undetermined in collections.)

Senta defecta, Grt. In 1897 this species was very numerous at light on July 19th, and stray individuals were seen several nights following, but in 1898 not a single specimen was taken.

Tapinostola variana, Morr. July 20th (3), 24th (1). Altogether about a dozen were taken, all at light, the others being found dead lying about the floor and shelves of my room. Also taken at Brandon and Cartwright.

Leucania pallens, Linn. Taken during July and August. Very common in July at light.

Leucania albilinea, Hbn. June 19th, etc., several at light.

" *phragmatidicola*, Gn. July, not uncommon at light.

Leucania commoides, Gn. Common at light in July, and very plentiful at bloom at Brandon in 1896, about the middle of the same month.

Leucania juncicola, Bdv. One at light, September 24th (1897.)

" *insueta*, Gn. June 18th, one at light; also from Cartwright.

Leucania unipuncta, Harv. Occasional at light, and at sugar from the middle of August until end of season. This species is usually a lively one at sugar, and a nuisance, driving off other things.

Ufeus plicatus, Grt. Cartwright, Douglas and Rounthwaite. Mr. Marmont says that Mr. Criddle, of Aweme, informed him that examples of this species were often captured in their house during the winter.

Nolophana malana, Fitch. Cartwright.

Caradrina miranda, Grt. Fairly common at light from middle of June into July.

Caradrina meralis, Morr. A pair at Brandon on September 1st, either at bloom or sugar.

Caradrina extimia, Walk. (= *civica*, Grt). Particularly common off bloom at Brandon during August. Also taken at light from 20th of July on.

- Caradrina punctivena*, Smith. Common at light from middle to end of July.
- Pyrophila tragopoginus*, Linn. One in 1895, not seen since.
- Pyrophila pyramidoides*, Gn. Common at sugar in Elm Park in 1896, from August 18th to middle of September.
- Orthodes cynica*, Gn. Rare here at light.
- " *crenulata*, Smith. Occasional at light during June.
- Tæniocampa thecata*, Morr. (No. 2335.) Cartwright.
- " *oviduca*, Grt. One or two at light, May 22nd, etc.
- Tæniocampa pacifica*, Harv. Plentiful with Mr. Heath. I got one or two at light early in May.
- Tæniocampa alia*, Gn. Cartwright.
- Tæniocampa subterminata*, Smith. Brandon. Mr. Boger has a specimen of this rather handsome species.
- Calymnia orina*, Gn. Brandon. Three specimens at sugar on August 21st (1897). One here at light August 6th, also from Cartwright. Prof. Smith says this is quite a variable species.
- Cosmia infumata*, Grt. Another very variable species. Comes freely to sugar and light, middle of August to end of September.
- Parastichtis discivaria*, Walk. This variable species is not uncommon at light, middle of July to middle of August, and I have often met with it during the day at rest on golden-rod.
- Ipimorpha pleonectusa*, Grt. Both seasons at light from middle to end of July, but not common.
- Pyrrhia exprimens*, Walk. Not uncommon at light in 1897, rather rare last season. End of June until middle of July. This species, too, has quite a range of variation.
- Orthosia ferruginoides*, Gn. Taken both at light and at sugar, out during part of August and September. A fresh specimen that I took at sugar on September 15th (1896) was so pale that I was sure I had taken a new species until I referred it to Prof. Smith.*
- Orthosia euroa*, G. & R. Occasional at light and at sugar during August, into September. On August 10th (1896), by sweeping Canada thistle heads after dark I could have taken hundreds of this species. The thistles were in a clearing among bush at River Park, near the city.

*This specimen was probably *decipiens*, Grt., which I had not recognized as distinct until the recent receipt of good material. (J. B. S.)

Orthosia Conradi, Grt. Occasional here at light towards end of July.

During the same month at Brandon in 1896 this was one of the common things on the wing about dusk.

Orthosia lutosa, Andr. July 12th (1898), one or two at light; also from Cartwright.

Homoglaea hircina, Morr. This early species was met with first this season. On April 14th and 15th I took a couple of dozen at light. These were easily divided into three forms or varieties.

Glæa inulta, Grt. Occasional at light, and one of the most plentiful species at sugar, end of August to end of season (October).

Xanthia flavago, Fabr. End of August to end of September. Taken at sugar, at bloom and at light, also by beating.

Cirroedia pampina, Gn. Common at sugar from middle of August until well on in September, comes to light. A somewhat variable species.

Scoliopteryx libatrix, Linn. Plentiful at sugar in Elm Park on Sept. 15th (1896). Taken as early as the 1st. Last season I took a specimen at light on May 20th.

Scopelosoma tristigmata, Grt. At sugar and light.

“ *Walkeri*, Grt. At sugar and light.

“ *sidus*, Gn. At sugar and light.

Scopelosoma devia, Grt. Two at sugar and another taken under a log on April 22nd (1894), the latter being a beautifully fresh specimen. I have taken these *Scopelosomas* at sugar from September 15th into October, also a few individuals in the spring at light; none of them have been taken in any numbers. *Walkeri* appear to vary considerably.

Litholomia napæa, Morr. Frequent at light during September.

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| <i>Xylina disposita</i> , Morr. | } At sugar from middle to end of September, also at light (September and May) and by beating. <i>Pexata</i> seems to be rare here, and of the others, the only really common species is <i>laticinerea</i> . <i>Xylinas</i> are often met with sitting on fences. On August 10th two pupæ were found under the bark of a stump, producing <i>Bethunei</i> at end of month. |
| “ <i>petulca</i> , Grt. | |
| “ <i>signosa</i> , Walk. | |
| “ <i>Bethunei</i> , G. & R. | |
| “ <i>contenta</i> , Grt. | |
| “ <i>Georgii</i> , Grt. | |
| “ <i>laticinerea</i> , Grt. | |
| “ <i>pexata</i> , Grt. | |

Xylina Thaxteri, Grt. I have not taken this species at sugar, my three specimens all being captured off fences.

Xylina capax, G. & R. A pair at light on September 1st (1897).

“ *carbonaria*, Harv. Cartwright.

Morrisonia vomerina, Grt. May 17th (1898), three specimens at light.
Xylomiges dolosa, Grt. Rare. Brandon and Rounthwaite.
Lithomia germana, Morr. Quite common in 1896 at sugar from August 27th to end of September, and has been taken at light.
Calocampa nupera, Lint.

" *cineritia*, Grt.

" *curvimacula*, Morr.

These three species have been taken at sugar in about equal numbers; *nupera* as early as the end of August, and a couple of weeks at least before the others. All have come to light, and I have taken *nupera*, if not the others, again in the spring, and also under a log (May 24th).

Cucullia asteroides, Gn. Quite rare, taken sitting on fence early in the summer.

Cucullia florea, Gn. Our common species at light during July; a specimen taken as late as September 1st, at rest on fence.

Cucullia Speyeri, Lint. One at Brandon at bloom about the middle of July.

Cucullia intermedia, Speyer. June 27th, July 12th, etc., an occasional specimen at light and on fences.

Cucullia albida, Smith. Mr. Marmont found this good species rather plentiful at Rounthwaite last season, and I got one in my house on May 18th.

Asteroscopus borealis, Smith. Cartwright. (See page 25 of present volume for description of this new species).

Ogdoconta cinereola, Gn. Several at light in 1897 about the middle of July.

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| <i>Abrostola urentis</i> , Gn. | } Occasional at light, both seasons, early in July; the latter was also taken off prairie flowers at Brandon in 1896. |
| <i>Deva purpurigera</i> , Walk. | |

Plusia ærea, Hbn. July 13th. I have never taken more than a single specimen of this species in Manitoba, though so common in the East.

Plusia æreoides, Grt. With the exception of *simplex*, our commonest *Plusia*, especially so at light during July in 1897.

Plusia balluca, Geyer. At light, August 3rd, etc., rare.

Plusia Putnami, Grt. Plentiful at light in 1897, early in July, and one taken as late as September 1st; rare in 1898. A pupa was found quite exposed on June 10th in a white loose cocoon attached to a weed.

- Plusia striatella*, Grt. (= *venusta*, Wlk). Over 60 specimens were taken in 1897 at light, from June 27th into August. Last season only four were seen.
- Plusia thyatiroides*, Gn. Rare, 5 specimens taken off *Heliopsis scabra* in Elm Park on August 18th and 24th (1896), and another off *Cnicus Canadensis* on August 15th (1895).
- Plusia bimaculata*, Steph. Not infrequent at light both seasons towards the end of July.
- Plusia biloba*, Steph. One captured at Brandon on July 23rd (1896), off *Cnicus undulatus*.
- Plusia precatationis*, Gn. Quite rare here, only 2 or 3 specimens taken at bloom, July 25th, August 11th, etc.
- Plusia californica*, Speyer. Only taken in 1895, two at bloom in my garden on July 29th, and another at light on the 30th.
- Plusia brassicæ*, Riley. One, July 30th (1895), in my garden. An unusually dark form of this species has been taken by Mr. Boger at Brandon.
- Plusia viridisignata*, Grt. (Dr. R. Ottolengui informs me that this is really (2632) *selecta*, Walk). July 19th, one at light in 1897.
- Plusia epigæa*, Grote. August 25th, one at bloom.
- Plusia ampla*, Walk. I have taken this specimen at light from the 22nd of June until July 12th, and in fair numbers.
- Plusia simplex*, Gn. A pale form of this species occurs here. The species is double-brooded, or appears to be on the wing throughout the summer; it was very plentiful on the prairie at Rounthwaite on September 11th last. Have only taken one specimen at light.
- Plusia flagellum*, Walk. (*monodon*, Grt., and *insolita*, Smith, are, Dr. Ottolengui tells me, identical). I first took this species at Brandon, at bloom on July 15th, 1896; the two following seasons it has come to light here from June 24th into July, some half dozen specimens being captured.
- Calpe Canadensis*, Beth. Only from Cartwright.
- Plusiodonta compressipalpis*, Gn. One on the wing when sugaring in Elm Park on August 27th (1896). Some years back, when living in Hamilton, Ont., I bred a number of these moths from numerous larvæ found feeding on moonseed (*Menispermum Canadense*). This vine covered the veranda of the house in which I lived. The larvæ taken early in July were full-grown and very beautiful; a second brood appeared about the middle of August.

Stibadium, sp. Several specimens of the same species were taken at light about the middle of July (1897); all were destroyed in the mails.

Heliethis phlogophagus, G. & R. Cartwright.

Alaria florida, Gn. Aweme, Cartwright and Rounthwaite.

Schinia cumatilis, Grt. Brandon and Cartwright. I took one at light at Brandon on August 20th (1897).

Schinia Meskeana, Grt. Brandon. I think Mr. Boger took a pair in 1896.

Dasypoudæa lucens, Morr. Rounthwaite. Two or three were captured by Mr. Marmont, all the same season.

Dasypoudæa Meadii, Grt. One specimen only in 1897, came to light on July 1st. A beautiful moth and in perfect condition.

Melaporphyria immortua, Grt. Rounthwaite.

" *ononis*, Fabr. Brandon and Rounthwaite.

Acontia erastrioides, Gn. } Taken from middle of June into July;

" *candefacta*, Hbn. } neither species abundantly.

Spragueia inornata, Grt. Common on the prairies, on the wing during the day, in June and again in August.

Metathorasa monetifera, Gn. One at light, July 2nd (1897).

Lithacodia bellicula, Hbn. June 9th into July. A common day flier on the prairies.

Erastria albidula, Gn. Plentiful at light, etc.

" *synochitis*, G. & R. Common in Elm Park, at rest on trees.

" *muscosa*, Gn. Rare here, one or two specimens taken.

" *carneola*, Gn. Common at light, etc.

Erastria includens, Smith. One here several years ago, and from Cartwright.

Galgula hepara, Grt. One here in 1894.

Drasteria erechtea, Cram. This very variable moth appears to be out during the whole season. I have taken it early in May, and fresh specimens as late as October.

Drasteria erichto, Gn. This species is not nearly so plentiful.

" *distincta*, Neum. Not common. June 12th to 19th.

Euclidia cuspidea, Hbn. One of our earliest day fliers, and too plentiful at light last June.

Melipotis limbolaris, Geyer. Brandon, Cartwright and Rounthwaite.

Catocala grynea, Cram. Aweme.

Catocala praeclara, G. & R. One at light, August 4th (1898), also from Cartwright.

Catocala Clintonii, Grt. Single specimens at light, July 14th and 20th (1898).

Catocala coccinata, Grote. July 21st to August 10th, a few at sugar in my garden.

Catocala parta, Gn. August 18th into September, at sugar in Elm Park in 1896, also seen from Brandon and Cartwright.

Catocala unijuga, Walk. Out with parta, but less local.

Catocala briseis, Edw. A somewhat variable species. Taken at light as early as July 12th, and at sugar until middle of September.

Catocala concumbens, Walk. Taken plentifully at light and at sugar. Is out in July and I have taken it at sugar on October 3rd. This is our common species in Manitoba.

Catocala aspasia, Strk. (3056 B) Cartwright.

Catocala relictæ, Walk. Taken at light, August 4th, etc., and at sugar until middle of September. Fairly plentiful.

Zale horrida, Hbn. One at light here on May 24th (1898).

Pheocyma lunifera, Hbn. One at light on May 23rd (1898).

Homoptera edusa, Dru. (var. B). One bred from pupa, evolved in April.

Homoptera minerea, Guen. Cartwright.

" *obliqua*, Gn. A pair at light on May 25th (1898).

Homopyralis tactus, Grt. Occasional at light.

Spargaloma sexpunctata, Grt. Rare, only a pair taken

Pseudaglossa lubricalis, Geyer. Cartwright.

Helia borealis, Smith. A pair taken at light in 1897.

Epizeuxis aemula, Hbn.

" *americalis*, Gn. } All fairly plentiful at light in July.

" *goasalis*, Walk. }

Hormisa orciferalis, Walk. (= *Sisyrhpena pupillaris*, Grt.) A pair here at light on July 20th (1898).

Megachyta deceptricalis, Grt. A pair at light in July.

Litognatha rubilifascia, Grt. One here at light.

Herminia morbidalis, Gn. Taken at light, etc.

" *petrealis*, Grt. Taken at light, etc.

Zanclognatha laevigata, Grt.

" *ochreipennis*, Grt. }

" *obscuripennis*, Grt. }

Taken at light, etc.; none commonly.

- Zanclognatha Hanhami*, Smith. Common at light in 1897, rare in 1898, middle to end of July.
- Pallachira bivittata*, Grt. July 7th, etc. (1897), six examples, none seen in 1898.
- Philometra longilabris*, Grt. } Both species seem rare here.
 " *eumelusalis*, Walk. }
- Rivula propinquialis*, Gn. } All are common species in Elm
Palthis angulalis, Hbn. } Park and they have been taken
Phalenophana rurigena, Grt. (3254) } at light.
- Capis curvata*, Grt. Rounthwaite.
- Renia flavipunctalis*, Geyer. One of our most common "snouts."
- Bleptina caradrinalis*, Gn. Another common species.
- Bomolocha scutellaris*, Grt. Elm Park, July.
- " *bijugalis*, Walk. Elm Park, July, not uncommon.
- " *toreuta*, Grt. A pair taken. Elm Park.
- " *sordidula*, Grt. A pair taken. Elm Park.
- " *profecta*, Grt. Elm Park, July, rare.
- " *deceptalis*, Walk. Only one taken.
- Hypena humuli*, Harr. Not uncommon.
- Hypena scabra*, Fabr. Worn examples taken on the wing in the spring; a common species, have taken it late at sugar.
- Hypena edictalis*, Walk. Not uncommon in Elm Park.
- " *eductalis*, Walk. (= 3277). One specimen taken.
 (To be continued.)

LIST OF COLEOPTERA FROM HALIFAX, N. S.

BY J. D. EVANS, TRENTON, ONT.

The beetles enumerated below were taken in 1897, some of them while the writer visited that city on the occasion of the annual meeting of The Royal Society of Canada, in June. Unfortunately, the weather was most unpropitious for insect hunting until the last day, when quite a number were taken, and later on in the season the list was increased by captures made by a brother, resident of the city.

While some of the species were well represented, very many were by only one or two specimens, and in a few cases by three or four. I feel very grateful to Prof. H. F. Wickham for kindly determining many of the species.

Cicindela 12-guttata, Dej.
Loricera cærulescens, Linn.

Corymbites tarsalis, Melsh.
Asaphes memnonius, Hbst.

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| <i>Bembidium lucidum</i> , Lec. | <i>Agrilus fallax</i> , Say. |
| “ <i>scopulinum</i> , Kirby. | “ <i>politus</i> , Say. |
| <i>Pterostichus lucublandus</i> , Say. | <i>Ellychnia corrusca</i> , Linn. |
| Common. | <i>Podabrus</i> , 2 sp. |
| <i>Pterostichus convexicollis</i> , Say. | <i>Telephorus fraxini</i> , Say. |
| “ <i>mutus</i> , Say. | “ <i>lineola</i> , Fab. |
| <i>Amara exarata</i> , Dej. Common. | <i>Thanasimus nubilus</i> , Kl. |
| <i>Amara pallipes</i> , Kirby. | <i>Platycerus depressus</i> , Lec. |
| var. <i>depressus</i> , Lec. | <i>Onthophagus nuchicornis</i> , Linn. |
| <i>Amara impuncticollis</i> , Say. | Common. |
| “ sp. Common. | <i>Aphodius fossor</i> , Linn. Common. |
| <i>Platynus extensicollis</i> , Say. | “ <i>fimetarius</i> , Linn. |
| “ <i>cupripennis</i> , Say. | “ <i>uricola</i> , Melsh. |
| “ <i>placidus</i> , Say. | “ <i>erraticus</i> , Linn. |
| “ <i>obsoletus</i> , Say. | <i>Diplotaxis tristis</i> , Kirby. |
| <i>Chlænien sericeus</i> , Forst. | <i>Trichius affinis</i> , Gory. |
| <i>Harpalus viridiæneus</i> , Beauv. | <i>Phymatodes dimidiatus</i> , Kirby. |
| Common. | <i>Hyperplatys maculatus</i> , Hald. |
| <i>Harpalus fallax</i> , Lec. | <i>Donacia proxima</i> , Kirby. |
| “ <i>basilaris</i> , Kirby. | <i>Bassaræus sellatus</i> , Suffr. |
| <i>Anisodactylus rusticus</i> , Say. | <i>Cryptocephalus 4-maculatus</i> , Say. |
| <i>Cercyon hæmorrhoidalis</i> , Fab. | <i>Chrysomela elegans</i> , Oliv. |
| “ sp. | * <i>Chrysomela staphylea</i> , Linn. ? |
| <i>Silpha surinamensis</i> , Fab. Common. | One sp. only. |
| <i>Silpha lapponica</i> , Hbst. | <i>Trirhabda tomentosa</i> , Linn. Common. |
| <i>Anthobium</i> , sp. | <i>Haltica bimarginata</i> , Say. |
| <i>Adalia bipunctata</i> , Linn. | <i>Isomira quadristriata</i> , Coup. |
| <i>Læmophloeus convexulus</i> , Lec. | <i>Cistelida</i> gn. sp. |
| <i>Peltis ferruginea</i> , Linn. | <i>Melandryadæ</i> “ |
| <i>Cyphon variabilis</i> , Thümb. | <i>Salpingus virescens</i> , Lec. |
| <i>Monocrepidius auritus</i> , Hbst. | <i>Nacerdes melanura</i> , Linn. |
| <i>Agriotes mancus</i> , Say. | <i>Anaspis rufa</i> , Say. |
| “ <i>limosus</i> , Lec. | <i>Attelabus rhois</i> , Boh. |
| <i>Dolopius lateralis</i> , Esch. | <i>Lepyryus colon</i> , Linn. |
| <i>Betarmon bigeminatus</i> , Rand. | <i>Hylobius confusus</i> , Kirby. |
| <i>Melanotus fissilis</i> , Say. | <i>Anthonomus corvulus</i> , Lec. |
| <i>Corymbites cylindriciformis</i> , Hbst. | “ <i>cratægi</i> , Walsh. |
| “ <i>spinus</i> , Lec. | <i>Dendroctonus terebrans</i> , Olio. |

*This *Chrysomela* is very near the European *Staphylea*, Linn., if it is not the same. Comparing it with one specimen from Europe, the Nova Scotian insect is larger, being .32 in., as compared to .26 in., the length of the one from Europe. The thorax of the European insect is more densely, and the elytra much more coarsely, punctured than in the N. S. insect.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

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(Paper No. 6.)

FAMILY XXIII.—Nyssonidæ.

Anyone with the use of my table of families ought readily to recognize any wasp falling in this family, and especially after reading my remarks under the family Mellinidæ. The only group that could possibly cause trouble or confusion would be the subfamily *Gorytinæ*, which closely resembles the *Mellinidæ*, but which may be easily separated from the latter by paying close attention to the shape of the first abdominal segment and examining the mesopleura for the mesosternal suture or carina.

The family Nyssonidæ may be divided into four distinct groups, which I have designated as subfamilies, and which are easily distinguished by the characters made use of in the following table :

Table of Subfamilies.

Marginal cell always pointed at apex, never truncate, and without an appendage; antennæ inserted far above the clypeus, always away from the clypeal suture.

Front wings with the second cubital cell broadly sessile, never triangular or petiolate, and receiving both recurrent nervures; mesopleural furrow usually deeply and sharply defined, complete Subfamily I., *Gorytinæ*.

Front wings with the second cubital cell petiolate, rarely triangular, sessile; mesopleural suture wanting or subobsolete, evanescent posteriorly.

Metathorax with the superior hind angles unarmed, rounded or obtuse; pronotum dorsally not short, subquadrate; forms elongate Subfamily II., *Alysoninæ*.

Metathorax with the superior hind angles always acute or produced into stout teeth or spines; pronotum dorsally short, narrowly transverse; forms broad, robust Subfamily III., *Nyssoninæ*.

Marginal cell always broadly truncate at apex, with an appendage; antennæ inserted close to the clypeus, or very close to the clypeal suture Subfamily IV., *Astatinæ*.

SUBFAMILY I.—Gorytinæ.

This subfamily approaches nearest to the Mellinidæ and is the only one that could possibly be confused with it. The characters of the first abdominal segment and of the mesopleura, already pointed out, will, however, readily separate it from the Mellinidæ.

From the other subfamilies, into which this family is divided, it is separated by the *sessile second cubital cell*, and, as a rule, by the distinct mesosternal suture.

The genera are somewhat numerous and closely allied, but may be distinguished by the use of the following table :

Table of Genera.

Mesosternum not separated from the mesopleura by a longitudinal suture or carina, the latter entirely wanting or indicated only slightly anteriorly ; cubitus in hind wings originating *beyond* the transverse median nervure, very rarely interstitial or nearly4.

Mesosternum always distinctly separated from the mesopleura by a longitudinal suture or carina (sometimes difficult to discern on account of the pubescence).

Cubitus in hind wings originating *before* the transverse median nervure, or interstitial or nearly2.

Cubitus in hind wings originating *far beyond* the transverse median nervure ; stigma not well developed, the radius originating from its apex..... 3.

2. Cubitus in hind wings originating *far* before the transverse median nervure.

Triangular area of metanotum sharply defined by grooved lines, the enclosure smooth, polished, not striate, or at most only slightly striate laterally at base. . . Pseudoplisus, Ashm., n. g.
(Type *G. floridanus*, Fox.)

Cubitus in hind wings interstitial or originating only a little before the transverse median nervure.

Cubitus in hind wings most frequently originating a little before the transverse median nervure ; triangular area of metanotum always well defined, the enclosure always longitudinally striate..... Hoplisus, Lepel.

Cubitus in hind wings *interstitial* ; triangular area of metanotum not sharply defined, but striate or coarsely rugose..... Hoplisoides, Gribodo.

3. Submedian cell longer than the median ; second cubital cell receiving both recurrent nervures ; anterior tarsi in ♀ with a comb ; triangular area of metathorax well defined, with some striæ at base..... Harpactus, Jurine.
= Dienoplus, Fox.
4. Second cubital cell not receiving both recurrent nervures ; hind tibiæ serrate 8.
Second cubital cell receiving both recurrent nervures, or rarely with the first recurrent interstitial with the first transverse cubitus ; hind tibiæ not serrate, although sometimes spinous.
Stigma not well developed, truncate at apex, the radius originating from its extreme apex..... 7.
Stigma well developed, not truncate at apex, the radius originating before its apex 5.
5. Anterior tarsi in ♀ *with* a comb..... 6.
Anterior tarsi in ♀ *without* a comb ; cubitus in hind wings originating far *beyond* the transverse median nervure.
First ventral segment *without* a carina or elevation, the second without an emargination at base, when viewed from the side, normal, not elevated..... Kaufmannia, Radoszk.
First ventral segment *with* a carina or elevation, the second abruptly truncate or with an emargination at base and elevated, so as to appear triangular when viewed from the side..... Gorytes, Latreille.
6. Transverse median nervure in front wings joining the median vein far *beyond* the origin of the basal nervure..... Lestiphorus, Lepel.
Transverse median nervure in front wings *interstitial* with the basal nervure.
Body marked with yellow ; first abdominal segment above convex ; scutellum with a transverse impressed line at base, but the same not crenulate..... Clitemnestra, Spinola.
Body wholly black ; first abdominal segment with a hump-like elevation above ; scutellum *with* a transverse, crenulate furrow at base. (New Zealand)..... Argogorytes, Ashm., n. g.
(Type *G. carbonarius*, Smith.)
7. Submedian cell in front wings longer than the median ; antennæ filiform or subclavate ; pulvilli normal ; abdomen mostly rufous.
Cubitus in hind wings originating distinctly beyond the transverse median nervure Harpactus, Jurine.

Cubitus in hind wings *interstitial* with the transverse median nervure Agraptus, Wesmael.

8. First recurrent nervure *interstitial* or nearly, the second recurrent received by the second cubital cell near its apex; anterior tarsi in ♀ *without* a comb. Miscothyris, Smith.

SUBFAMILY II.—Alysoninæ.

This is a natural group, of small extent, and represented by only two genera, found in both hemispheres.

The species are somewhat narrowed and elongate, and superficially resemble the *Psenina*, in the family Pemphredonidæ, although structurally they are widely separated.

Our species have been monographed recently by Mr. Wm. J. Fox.

The genera may be distinguished as follows:

Table of Genera.

Submedian cell in front wings much longer than the median, the transverse median nervure joining the median vein far *beyond* the origin of the basal nervure; abdomen with a pale spot at each side of the second segment. Didineis, Wesmael.

Submedian cell of front wings a little shorter than the median, the transverse median nervure joining the median vein a little *before* the basal nervure; abdomen without a pale spot on each side of the second segment. Alyson, Jurine.

SUBFAMILY III.—Nyssoninæ.

This is also a natural and compact group, allied to the *Alysonina*, but markedly distinct in the more robust form and by the toothed metathoracic angles. In this last characteristic it shows some affinity with the Stizidæ, but otherwise—in mouth-parts, venation of wings, and in its thoracic characters—the subfamily is quite distinct and easily separated.

Our species in this group have been monographed recently by Mr. Wm. J. Fox, who, however, has suppressed all genera and placed all our species in the genus *Nysson*, Latr. Mr. Fox's work is excellent, but I do not believe in such wholesale lumping, and in the following table I have restored all of these genera, making use of such salient characters as I believe will render their recognition easy and certain.

Table of Genera.

Front wings with two cubital cells, the third transverse cubitus always wanting. 5.

Front wings with three cubital cells, the second always petiolate; if with only two cubital cells, the second transverse cubitus wanting.

- Two cubital cells, the first receiving both recurrent nervures 3.
 Three cubital cells 2.
2. Second cubital cell receiving only one recurrent nervure 4.
 Second cubital cell receiving both recurrent nervures.
 Cubitus in hind wings originating *before* the transverse median nervure or interstitial with it; hind tibiæ usually spinous, but not serrate on hind margin; scutellum normal; apex of abdomen in ♂ terminating in 2 teeth Nysson, Latrèille.
 Cubitus in hind wings originating beyond the transverse median nervure.
 Hind tibiæ with feeble spines, never serrate; lateral margins of scutellum sometimes more or less margined, the post-scutellum normal; apex of ♂ abdomen terminating in 2 teeth Brachystegus, Costa.
 Hind tibiæ strongly *serrated* on hind margin, and also more or less spinous; lateral margins of scutellum more or less strongly reflexed, the postscutellum bilobed; apex of ♂ abdomen terminating in 4 teeth Paranysson, Guérin.
3. Cubitus in hind wings originating *beyond* the transverse median nervure, the latter short, straight, perpendicular; hind tibiæ on outer face armed with 4 teeth; pygidium very long, with the lateral margins denticulate Metanysson, Ashm., n. g.
 (Type N. Solani, Ckll.)
4. Second cubital cell receiving only one recurrent nervure—*the second*, the first recurrent nervure received by the first cubital cell near its apex; posterior coxæ armed with a spine or tubercle at apex; abdomen normal Helioryctes, Smith.
 (Type H. melanopyga, Smith.)
- Second cubital cell receiving only one recurrent nervure—*the first*, the second recurrent nervure received by the third cubital cell far beyond the second transverse cubitus; posterior coxæ unarmed; hind tibiæ and scutellum as in *Nysson*; abdomen with ventral segments 4-6 each with a lateral tooth, apex of abdomen in ♂ 3-dentate Foxia, Ashm.
5. Second cubital cell triangular, but not petiolate, the first recurrent nervure received by the first cubital cell near its apex, the second recurrent interstitial; metathorax with the superior hind angles produced into strong stout spines Acanthostethus, Smith.

Second cubital cell petiolate, receiving both recurrent nervures ; meta-thoracic teeth small, acute ; scutellum normal ; legs smooth, not spinous Hyponyssou, Cresson.

SUBFAMILY IV.—Astatinae.

Distinguished from all the other subfamilies by the truncate, appendiculate marginal cell in the front wings, and by the antennæ being inserted far anteriorly, close to the clypeal suture.

Fox has correctly pointed out the close relationship between his genus *Diploplectron* and *Dinetus*, Jurine, but both genera are too closely related to *Astutus* to warrant their separation as a distinct tribe.

Four genera fall into this group, separated as follows :

Table of Genera.

Marginal cell along the costa, much longer than the stigma ; eyes in ♂ holoptic ; front wings with three cubital cells 3.
Marginal cell, along the costa not longer than the stigma, most frequently shorter ; eyes in ♂ normal, not holoptic.

Front wings with three cubital cells 2.

Front wings with two cubital cells.

Clypeus at apex in ♀ 3-dentate ; tarsal comb distinct ; all tibiæ spinous : antennæ in ♂ twisted, the scape much swollen, the flagellar joints 1-6 compressed ; anterior tarsi flattened *Dinetus*, Jurine.

2. Clypeus medially convex, slightly produced anteriorly, without teeth ; tarsal comb long, distinct ; tibiæ spinous ; antennæ filiform, similar in both sexes *Diploplectron*, Fox.

3. Second cubital cell not receiving both recurrent nervures, the first recurrent nervure *interstitial* with or received a little before the first transverse cubitus ; marginal cell not quite twice as long as wide ; eyes in ♂ *not* extending to base of mandibles ; pronotum in ♀ strongly developed and not hidden beneath the anterior margin of the mesonotum ; first cubital cell much longer than the second or third, nearly as large as both united *Dryudella*, Spinola.

Second cubital cell receiving both recurrent nervures ; marginal cell at least twice as long as wide, and still longer in the ♂ ; eyes in ♂ extending to the base of mandibles ; pronotum in both sexes deeply impressed beneath the anterior margin of the mesonotum ; first cubital cell only slightly different from the second or third *Astutus*, Latreille.

North American Species.

- Subfamily I.—*Gorytinae*. (16) *H. ruficornis*, Prov., ♀ ♂.
- (1) *PSEUDOPILISUS*, Ashmead. (17) *H. simillimus*, Smith, ♀ ♂.
= *eppipiata*, Prov.
- (1) *P. abdominalis*, Cr., ♀ ♂.
= *propinquus*, Cr. (18) *H. vicinus*, Hdl.
- (2) *P. aequalis*, Hdl., ♀ ♂. (3) *HOPLISOIDES*, Gribodo.
- (3) *P. alpestris*, Cam., ♀ ♂. (1) *H. armatus*, Prov.
- (4) *P. alticola*, Cam., ♀ ♂. (2) *H. asperatus*, Fox.
- (5) *P. balteatus*, Cam., ♀. (3) *H. bigeloviae*, Ckll.
- (6) *P. bipartitus*, Hdl., ♀ ♂. (4) *H. barbatulus*, Hdl., ♂.
- (7) *P. cameronis*, Hdl., ♀ ♂. (5) *H. confertus*, Fox.
- (8) *P. centralis*, Cam., ♀. (6) *H. Coquilletti*, Fox.
- (9) *P. divisus*, Smith, ♂. (7) *H. costalis*, Cr.
- (10) *P. fasciatus*, Fox, ♀. (8) *H. dentatus*, Fox.
- (11) *P. floridanus*, Fox, ♀. (9) *H. denticulatus*, Pack.
- = *foveolatus*, Fox. (10) *H. gracilis*, Pattn.
- (12) *P. fulvipennis*, Smith. (11) *H. hamatus*, Hdl., ♂.
= *micantula*.
- (13) *P. fuscipennis*, Cam., ♀. (12) *H. laminiferus*, Fox, ♂.
- (14) *P. montanus*, Cam., ♂. (13) *H. maculipennis*, Cam.
- (15) *P. notabilis*, Hdl., ♀ ♂. (14) *H. mexicanus*, Cam., ♀.
- (16) *P. phaleratus*, Say, ♀ ♂. (15) *H. microcephalus*, Hdl.
- = *flavicornis*, Pack. (16) *H. mirandas*, Fox.
- = *modestus*, Cr. (17) *H. nebulosus*, Pack.
- = *rufoluteus*, Pack. (18) *H. Pergandii*, Hdl.
- (17) *P. rubiginosus*, Hdl., ♀ ♂. (19) *H. placidus*, Smith.
= *rufipes*, Sm
- (18) *P. Smithii*, Cr., ♀. (20) *H. punctifrons*, Cam.
- (19) *P. splendidus*, Hdl., ♀. (21) *H. pygidialis*, Fox, ♀.
- (20) *P. venustus*, Cr., ♀ ♂. (22) *H. robustus*, Hdl., ♀.
- (2) *HOPLISUS*, Lepeletier. (23) *H. rugosus*, Pack.
- (1) *H. albosignatus*, Fox. (24) *H. seminiger*, Dahlb.
- (2) *H. angustatus*, Prov. (25) *H. scitulus*, Cr.
- (3) *H. atricornis*, Pack, ♂. (26) *H. sepulchralis*, Hdl.
- (4) *H. atrifrons*, Fox, ♀ ♂. (27) *H. spilopectus*, Hdl.
- (5) *H. canaliculatus*, Pack. (28) *H. tricolor*, Cress., ♀ ♂.
- (6) *H. cayenensis*, Spin., ♀ ♂.
- (7) *H. compactus*, Fox.
- (8) *H. decorus*, Fox, ♀ ♂. (4) *HARPACTUS*, Jurine.
= *Dienoplus*, Fox.
- (9) *H. diversus*, Fox, ♀.
- (10) *H. fasciatipennis*, Cam., ♀. (1) *H. Cockerellii*, Ashm., ♀.
- (11) *H. fuscus*, Tischb., ♀ ♂. (2) *H. Howardii*, Ashm., ♀.
- (12) *H. geminus*, Hdl., ♀ ♂. (3) *H. insularis*, Cr.
- (13) *H. maculipes*, Cam. (4) *H. lateritius*, Hdl., ♀ ♂.
- (14) *H. nevadensis*, Fox, ♀ ♂. (5) *H. mendicus*, Hdl., ♀ ♂.
= *pictifrons*, Fox.
- (15) *H. Provancheri*, Hdl., ♂.
= *laticinctus*, Prov. (6) *H. tristrigatus*, Fabr., ♀ ♂.

- (7) *H. (?) insolitus*, Fox, ♂. (14) *N. nigripes*, Prov., ♂.
(Gorytes.) (15) *N. quinquespinosus*, Say, ♀
(5) KAUFMANNIA, Radoszk. ♂.
(6) GORYTES, Latreille. (16) *N. zapotecus*, Cr., ♀.
(1) *G. campestris*, Linné, ♀ ♂. (17) *N. Aztecus*, Cr., ♀.
(2) *G. costalis*, Cr., ♀. (15) BRACHYSTEGUS, Costa.
(3) *G. mystaceus*, L., ♀ ♂. (1) *B. opulentus*, Gerst., ♀ ♂.
(4) *G. nigrifrons*, Smith, ♀ ♂. (2) *B. mellipes*, Cr., ♀ ♂.
(5) *G. (?) piceus*, Hdl., ♂. (3) *B. bellus*, Cr., ♀.
(6) *G. (?) spilographus*, Hdl. (4) *B. tuberculatus*, Handl., ♀ ♂
(7) LESTIPHORUS, Lepel. (5) *B. basilaris*, Cr., ♀.
(8) CLITEMNESTRA, Spinola. (6) *B. pumilus*, Cr., ♂.
(9) ARGOGORYTES, Ashmead. (7) *B. albomarginatus*, Cr., ♀ ♂
(10) AGRAPTUS, Wesmael. (8) *B. moestus*, Cr., ♀.
(11) MISCOTHYRIS, Smith. (16) PARANYSSON, Guérin.
Subfamily II.—*Alysoninae*. (1) *P. texanus*, Cr., ♀ ♂.
(12) DIDINEIS, Wesmael. (2) *P. fuscipes*, Cr., ♀ ♂.
(1) *D. aculeata*, Cr., ♂. (Alyson.) (3) *P. mexicanus*, Cr., ♀ ♂.
(2) *D. nodosa*, Fox, ♂. (4) *P. dives*, Handl., ♀ ♂.
(3) *D. peculiaris*, Fox, ♀ ♂. (5) *P. armatus*, Cr., ♀ ♂.
(4) *D. solidescens*, Scudd. (Fossil.) (17) METANYSSON, Ashmead.
(5) *D. texana*, Cr., ♀ ♂. (1) *M. Solani*, Ckll.
(13) ALYSON, Jurine. (18) HELIORYCTES, Smith.
(1) *A. conicus*, Prov., ♂. (19) FOXIA, Ashmead.
(2) *A. Guignardii*, Prov., ♀ ♂. (1) *F. pacifica*, Ashm., ♀ ♂.
(3) *A. melleus*, Say, ♀ ♂. (20) ACANTHOSTETHUS, Smith.
(4) *A. oppositus*, Say, ♀ ♂. (21) HYPONYSSON, Cresson.
(5) *A. radiatus*, Fox, ♀ ♂. (1) *H. bicolor*, Cr., ♀.
(6) *A. striatus*, Fox, ♂. Subfamily IV.—*Astatinae*.
(7) *A. triangularis*, Fox. (20) DINETUS, Jurine.
(8) *A. triangulifer*, Prov., ♂. (21) DIPLOPECTRON, Fox.
Subfamily III.—*Nyssoninae*. (1) *D. ferrugineus*, Ashm., ♀.
(14) NYSSON, Latreille. (2) *D. brunneipes*, Cr., ♀ ♂.
(1) *N. spinosus*, Forst., ♀ ♂. (3) *D. bidentatus*, Ashm., ♀.
(2) *N. plagiatus*, Cr., ♀ ♂. (4) *D. Foxii*, Ashm., ♀.
(3) *N. Frey-Gessneri*, Hdl., ♀ ♂. (22) DRYUDELLA, Spinola.
(4) *N. auronotatus*, Say, ♀ ♂. (23) ASTATUS, Latreille.
(5) *N. aequalis*, Pattn., ♀ ♂. (1) *A. unicolor*, Say, ♀ ♂.
(6) *N. compactus*, Cr., ♀ ♂. (2) *A. occidentalis*, Cr., ♀ ♂.
(7) *N. subtilis*, Fox, ♂. (3) *A. Leustromi*, Ashm., ♀.
(8) *N. rusticus*, Cr., ♀ ♂. (4) *A. nubeculus*, Cr., ♀ ♂.
(9) *N. simplicicornis*, Fox, ♂. = *nigrospilosus*, Cr.
(10) *N. lateralis*, Pack., ♂. (5) *A. asper*, Fox, ♀ ♂.
(11) *N. tristis*, Cr., ♂. (6) *A. bicolor*, Say, ♀ ♂.
(12) *N. fidelis*, Cr., ♀ ♂. (7) *A. pygidialis*, Fox, ♀.
(13) *N. rufiventris*, Cr., ♀ ♂. (8) *A. nevadicus*, Cr., ♀ ♂.

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| (9) <i>A. montanus</i> , Cr., ♀. | (16) <i>A. apicipennis</i> , Cam. |
| (10) <i>A. elegans</i> , Cr., ♀ ♂. | (17) <i>A. tinctipennis</i> , Cam., ♀. |
| (11) <i>A. bellus</i> , Cr., ♂. | (18) <i>A. Kohlii</i> , Cam., ♀. |
| (12) <i>A. coeruleus</i> , Cr., ♂. | (19) <i>A. picta</i> , Kohl, ♂. |
| (13) <i>A. albobillosus</i> , Cam., ♀. | (20) <i>A. mexicana</i> , Cr., ♂. |
| (14) <i>A. Sayi</i> , Fox, ♀. | (21) <i>A. alpestris</i> , Cam., ♀. |
| (15) <i>A. strigosa</i> , Kohl, ♀. | (22) <i>A. insularis</i> , Cr., ♀. |

TABLES FOR THE DETERMINATION OF THE GENERA OF COCCIDÆ.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

(Continued from page 279.)

LECANIINÆ.

- Secretion of ♀ more or less cottony.....Series I.
 Secretion of ♀ waxy, glassy, or horny.....Series II.
 Adult ♀ naked, or covered only by a film of secretion.....Series III.

Of course it must be understood that the expressions "glassy," "horny," and "cottony," refer only to the *appearance* of the secretion, not to its true nature.

SERIES I.

- Female resembling a flat *Lecanium*, secreting an ovisac, which is elongated posteriorly, but does not at all cover the insect 1.
 Female surrounded by cottony secretion, but naked dorsally..... 4.
 Female completely or almost completely covered by a sac of cottony or felted secretion..... 5.
 Female secreting dorsally a thick mass of white waxy threads, which however do not cover the middle of the back; round the sides are threads spreading in all directions; antennæ six-jointed, 3 much the longest; legs rather slender; tibia longer than tarsus..... *Ceronema*, Mask.
 Female oval or elliptical, with a loosely felted secretion, especially in the second stage, but absent or inconspicuous in the adult; antennæ 7-jointed: tarsus longer than tibia; margin with a fringe..... *Eriochiton*, Mask.
 1. Female triangular, ovisac very slightly developed, a mere fringe round the hind margin..... *Protopulvinaria*, Ckll.
 Female oval or suboval..... 2.

2. Ovisac greatly elongating, free except at the end, lifting the insect into the air..... *Takahashia*, Ckll;
Ovisac continuously adherent to the twig or leaf..... 3.
3. Body of ♀ more or less chitinous, becoming hard, and without dorsal patches of secretion..... *Pulvinaria*, Targ.*
Body of ♀ soft, not chitinous, pink in front, greenish on dorsum, with some black specks; back with patches of white secretion..... *Philephedra*, Ckll.
4. Antennæ 7-jointed; larva with strongly produced caudal tubercles; second stage with waxy secretion, somewhat as in
Orthezia..... *Pseudopulvinaria*, Atkinson.
Antennæ 8 jointed; ovisac cone-shaped, fluted.... *Pulvinella*, Hempel.
5. Antennæ and legs quite rudimentary; skin not chitinous; thickly covered on dorsal surface with round glands; cottony secretion profuse..... *Pseudophilippia*, Ckll.
Antennæ and legs well-formed..... 6.
6. Antennæ 8-jointed (sometimes 7 in *Spermococcus*)..... 7.
Antennæ 7-jointed; ♀ elliptical and convex, sac closely felted; skin with many large circular glands, and numbers of tubular glands; larva with strongly produced caudal lobes. [Possibly this may belong to the Coccinæ]... *Mallococcus*, Mask. (*Mallophora*, Mask.).
Antennæ 6-jointed..... 8.
7. Body greatly elongated (like *Pergandiella*, etc.), with parallel sides; a considerable cephalic portion in front of the antennæ; legs ordinary, slender, and well developed..... *Signoretia*, Targ.
Body ovate; legs and antennæ slender; anterior tarsi two-jointed; antennæ 8-jointed; 8 the smallest. In ants' nests..... *Exæretopus*, Newstead, 1894.
Body about twice as long as broad; secreting at the last some cottony matter; antennæ 7 or 8-jointed, broad at the base; legs normal. In ants' nests. [Doubtfully distinct from
Lecanopsis.]..... *Spermococcus*, Giard, 1893.
Body oval or suboval, like a *Pulvinaria*; ovisac produced posteriorly, often felted, usually leaving the cephalic end of the insect more or less exposed..... *Lichtensia*, Sign.

* *Tectopulvinaria*, Hempel, is an allied genus from Brazil, not yet published.

8. Elongated like *Signoretia*, but broader in the thoracic region ; legs very short ; antennæ short and stout, all the segments except 3 and 6 broader than long ; sac cottony.....*Eriopeltis*, Sign.
Oval ; legs and antennæ slender and ordinary ; sides of the body and dorsum with numerous tubular glands ; sac felted...*Filippia*, Targ.

SERIES II.

- Male pupæ enclosed in a mass of spongy wax, which surrounds the wings.....*Ericerus*, Guér.
Male pupæ separate1.
1. Covering of ♂ horny in texture, formed partly of the pellicle of the second stage ; antennæ in adult short, confusedly 7-jointed ; legs absent ; viviparous.....*Lecanochiton*, Maskell.
Not so.....2.
2. Covering of ♀ consisting of wax, often thick ; no marginal fringe or radiating processes ; a more or less developed caudal horn, visible on removing the wax.....*Ceroplastes*, Gray.
Covering of ♀ consisting of wax, not thick, with seven long radiating processes arising from the margin, giving the insect a star-like appearance.....*Vinsonia*, Signoret.
Covering of ♀ waxy, not thick, with a marginal fringe of tooth-like processes, resembling more or less the teeth of a saw ; antennæ and legs present.....*Ctenochiton*, Maskell.
Covering of ♀ glassy, or at least brittle, thin.....3.
3. Legs and antennæ present in adult4.
Legs and antennæ absent in adult8.
4. Scale divided into plates, and striated with rows of air-cells.....*Inglisia*, Maskell.
Scale not striated with air-cells.....5*.
5. Scale divided into two portions, each with small grooves radiating from its apex ; antennæ 8-jointed*Parafairmairia*, nov. nom.
(*Fairmairia*, Signoret, 1874 : not of Desv., 1863.)
Scale not divided into two such portions.....6.
6. Scale perfectly flat ; glossy secretion in middle of back more or less broken up into small oval plates ; genital aperture surrounded by cottony matter ; antennæ 8-jointed ; ♂ scale with dorsal area so narrow as to be practically a single ridge.....*Lagosinia*, n. g. (Type *Lagosinia Strachani* †.)

*Mr. Hempel, in describing *Edwallia*, does not say whether it has the air-cells or not.

†*Lecanium Strachani*, Ckll., Entm., 1898, p. 259.

- Scale cone-shaped, with radiating ridges; antennæ 5-jointed. *Edwallia*, Hempel.
- Scale convex, but not cone-shaped; not divided at all, but rough or beset with protuberances; antennæ 7 or 8-jointed 7.
7. Natives of the arid region of N. America. *Ceroplastodes*, Ckll. 1893.
- Native of India. *Ceroplastodes cajani* (Maskell).*
8. Quite flat, circular, with the glassy covering in two parts, divided longitudinally in the middle line; glassy covering with rows of air-cells as in *Inglisia*. *Platinglisia*, Ckll., 1899.
- Moderately convex, with the glassy covering in two parts, divided longitudinally, each part with a low eminence, from which lines radiate. *Schizochlamidia*, Ckll., ined.
- Very convex, with conical protuberances; glassy covering without rows of air-cells. *Pseudokermes*, Ckll., 1895.
- (To be continued.)

NEW GENERA AND SPECIES OF NYCTERIBIDÆ AND HIPPOBOSCIDÆ.

BY D. W. COQUILLET, WASHINGTON, D. C.

Pterellipsis, n. gen.—Near Megistopoda, but with aborted wings. Head once and a half as high as long, in profile subhemispherical, covered with bristles which are longest on upper part of the front; eyes oval, situated on sides of head slightly behind the middle, no ocelli; antennæ one-jointed, flattened, elliptical, three-fourths as long as the head, once and a half as long as wide, covered with bristles and bearing a long one at apex. Thorax greatly compressed, strongly gibbous, the sternum flattened, its front end lamelliform and prolonged in front of the anterior coxæ, a longitudinal impressed median line and on each side, slightly behind its middle, is an impressed line extending from it obliquely outward and backward to the lateral margin just behind the middle coxæ; wings narrow, projecting obliquely upward and forward, divaricate, once and one-third as long as height of thorax, four times as long as wide, with three veins besides the costal, each of the median veins forked near the middle, the front fork of the anterior vein reaches the costa near the last fourth of its length, the posterior fork ends in the extreme tip of the wing; the forks of the following vein are united

**Eriochiton cajani*, Maskell, Ind., Mus. Notes, Vol. II., p. 61. I can only leave this in *Ceroplastodes* for the present, but I think the resemblance to that genus is probably due to convergence and not to real affinity.

at their apices, and extended obliquely forward, reaching the wing-margin slightly below the tip; a short distance before this union the anterior branch is connected by a crossvein with the posterior branch of the preceding vein; the other vein extends along the posterior margin of the wing nearly to its middle, then unites with the posterior fork of the preceding vein; veins bearing several stout bristles; halteres distinct; front femora considerably thickened, their tibiae rather slender, middle femora rather robust, once and a third as long as the front ones, their tibiae as thick as and nearly twice as long as the front ones, hind femora and tibiae more slender than and nearly twice as long as the middle ones, each femur bearing several bristles, the tibiae destitute of bristles; first four joints of the front and middle tarsi subequal in length, each slightly broader than long, together slightly longer than the fifth, which is considerably swollen; first joint of the hind tarsi twice as long as wide, as long as the two succeeding joints, the last joint swollen, as long as the three preceding ones; each tarsal claw bears a large lobe at the base of the under side. Abdomen elongate-ellipsoidal, broader and slightly longer than the thorax, bare except at each end and on the venter, where there are a few bristles. Type, the following species:

Pterellipsis aranea, n. sp.—Pale yellow, the abdomen opaque grayish black, knob of halteres white, tarsal claws and the lobe at their base black, bristles brownish yellow. Length 2 mm. Jamaica and Montserrat, W. I. Three specimens taken on bats in caves by the late Mr. H. G. Hubbard. Also 23 specimens collected on bats in Porto Rico by Mr. A. Busck. Type No. 4208, U. S. Nat. Museum.

Trichobius major, n. sp.—Reddish yellow, the abdomen largely grayish black, halteres white, tarsal claws black, the latter lobed at base of the under side; thorax scarcely longer than high; wings whitish yellow, veins yellow, first vein reaching the costa near last sixth of length of wing; abdomen of female bare except a cluster of bristly hairs on each side near the base and at the tip; in the male the hairs in these four clusters are much more numerous. Length 3 to 4.5 mm. Gum Cave, Citrus Co., Florida, and Chiricahua Mts., Ariz. Fifteen males and sixteen females, collected on bats by the late Mr. H. G. Hubbard. Type No. 4209, U. S. Nat. Museum.

Aspidoptera n. gen.—Near *Trichobius*, but the wings reduced to oblong, coriaceous organs appressed to the body and not reaching beyond the first fourth of the length of the abdomen, densely covered with rather long bristles. Head in profile subquadrate, but the upper margin longer than

the lower, vertical diameter only slightly shorter than the longitudinal, covered with stout bristles which are longest on the upper part of the head ; eyes narrow, situated near middle of sides of head, no ocelli ; antennæ inserted near lower part of the face, projecting obliquely forward and upward, nearly as long as the head, apparently one-jointed, greatly depressed, oval only slightly longer than broad, bristly and with a longer bristle at apex of each. Thorax polished, depressed, about twice as long as high, mesonotum covered with stout bristles, a median sulcus extending from the front end to the transverse sulcus, which is at the last fifth of the mesonotum. Wings inserted on the posterior end of the thorax, less than twice as long as broad; halteres normal. Legs short, femora greatly swollen, less than twice as long as thick, tibiæ flattened, as long as the femora but less than half as wide, first four joints of tarsi subequal in length, much wider than long, together as long as the fifth which is greatly swollen, claws lobed at base of under side. Type, the following species :

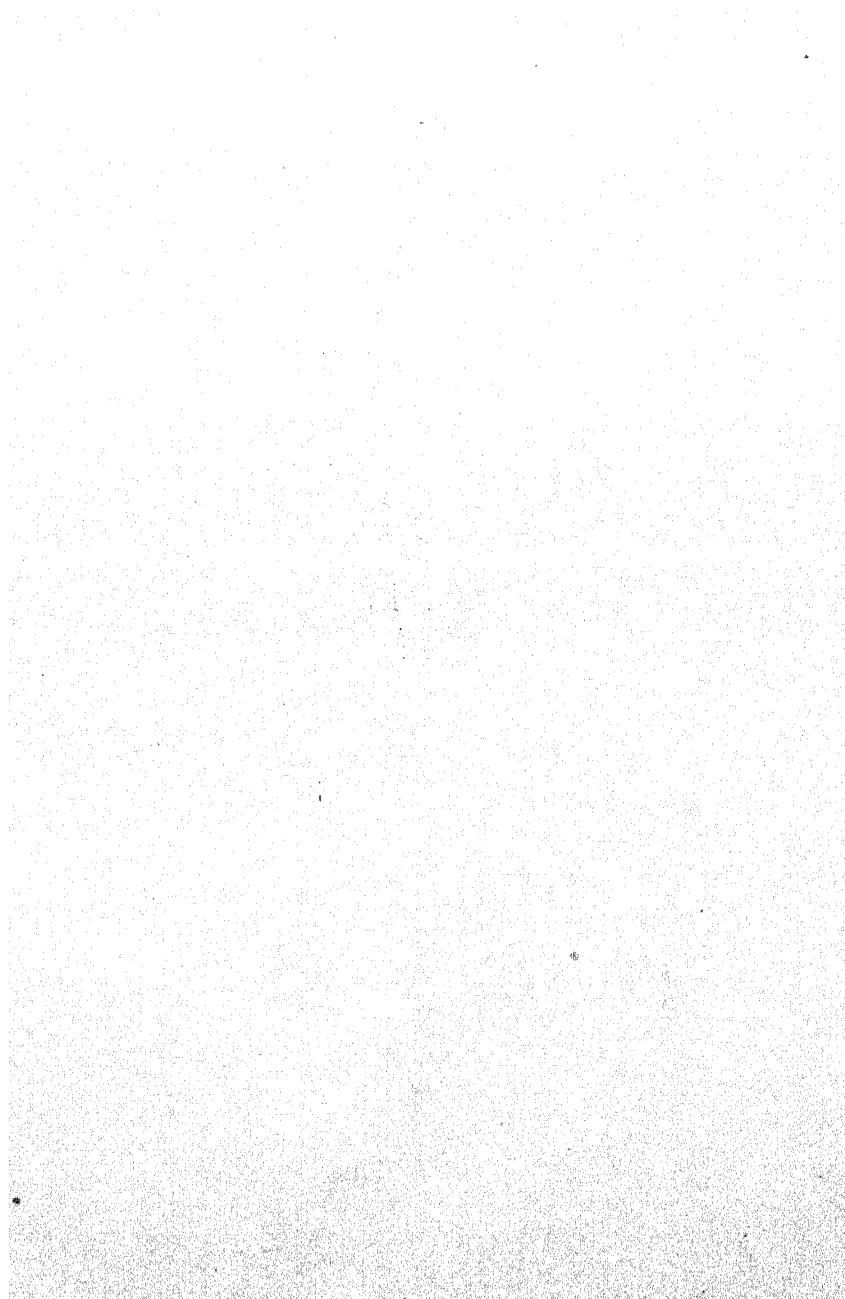
Aspidoptera Busckii n. sp.—Reddish yellow, the palpi and legs light yellow, tarsal claws black, halteres white, head with a subtriangular black spot each side of the middle of the upper side, abdomen opaque, tinged with gray, only slightly longer than broad, bristly on each side at the base and at the extreme apex, composed of two segments of which the basal one is less than one-fifth as long as the other. Femora bearing numerous bristles on the upper sides, the tibiæ with a rather long pubescence. Length 2 mm. A female specimen, found on a bat, *Artibeus* sp., in a cave at Bayamon, Porto Rico, Jan. 15, 1899, by Mr. A. Busck, after whom the species is named. Type No. 4210, U. S. Nat. Museum.

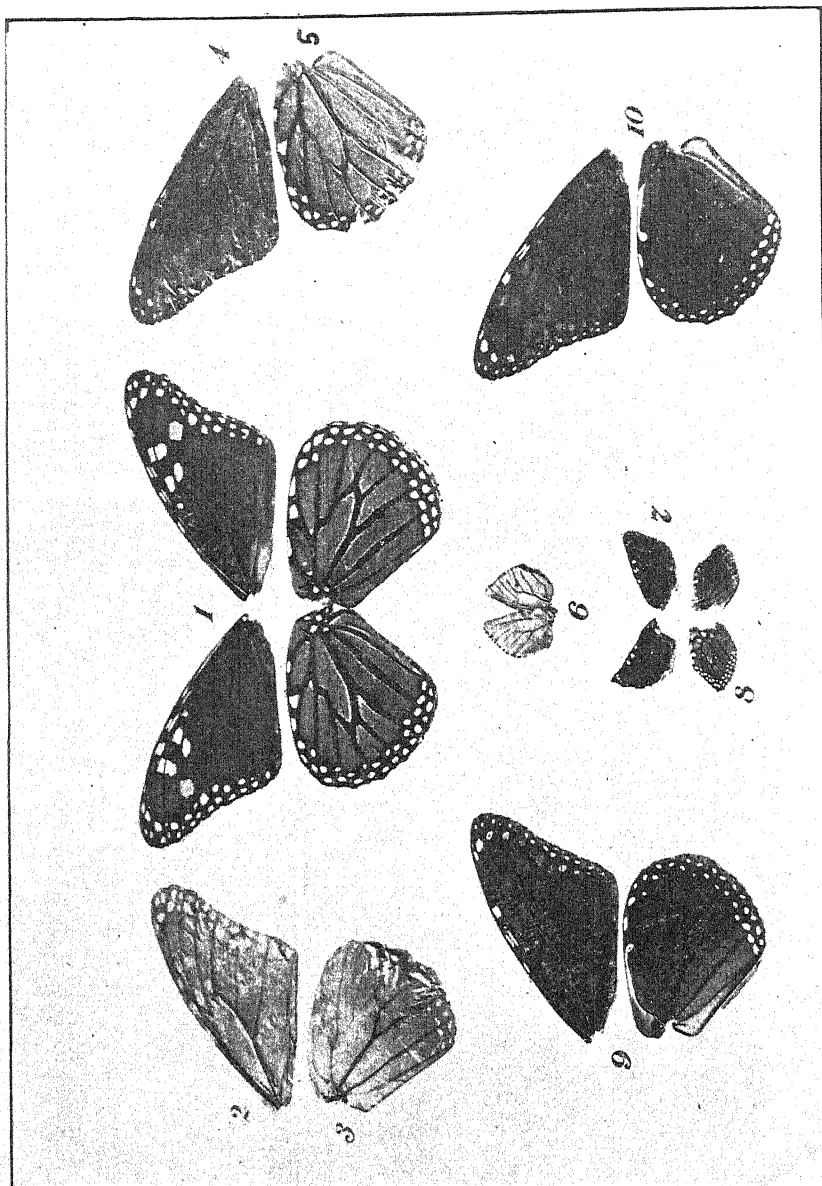
In Dr. Williston's recent manual the genus *Ornithomyia* is credited with tridentate tarsal claws, while in Olfersia they are said to be bidentate. As a matter of fact, the claws in these two genera are structurally identical, each having two blunt-pointed teeth near the base of the under side. Our Hippoboscoid genera with fully developed wings separate as follows :

1. Anal cell closed by crossvein 2.
 Anal cell open to the wing-margin, ocelli wanting 4.
2. Humeral angles projecting forward in the form of long tubercles,
 antennæ greatly depressed, not situated in cavities, projecting at least
 nearly half the greatest diameter of the eyes in front of the latter . . . 3.
- Humeral angles rounded or only slightly projecting, antennæ subovate,
 situated in cavities, projecting less than one-fourth greatest diameter
 of eyes in front of the latter (*Ornithomyia confluenta*,
 Say) *Anthoica*? Rond.

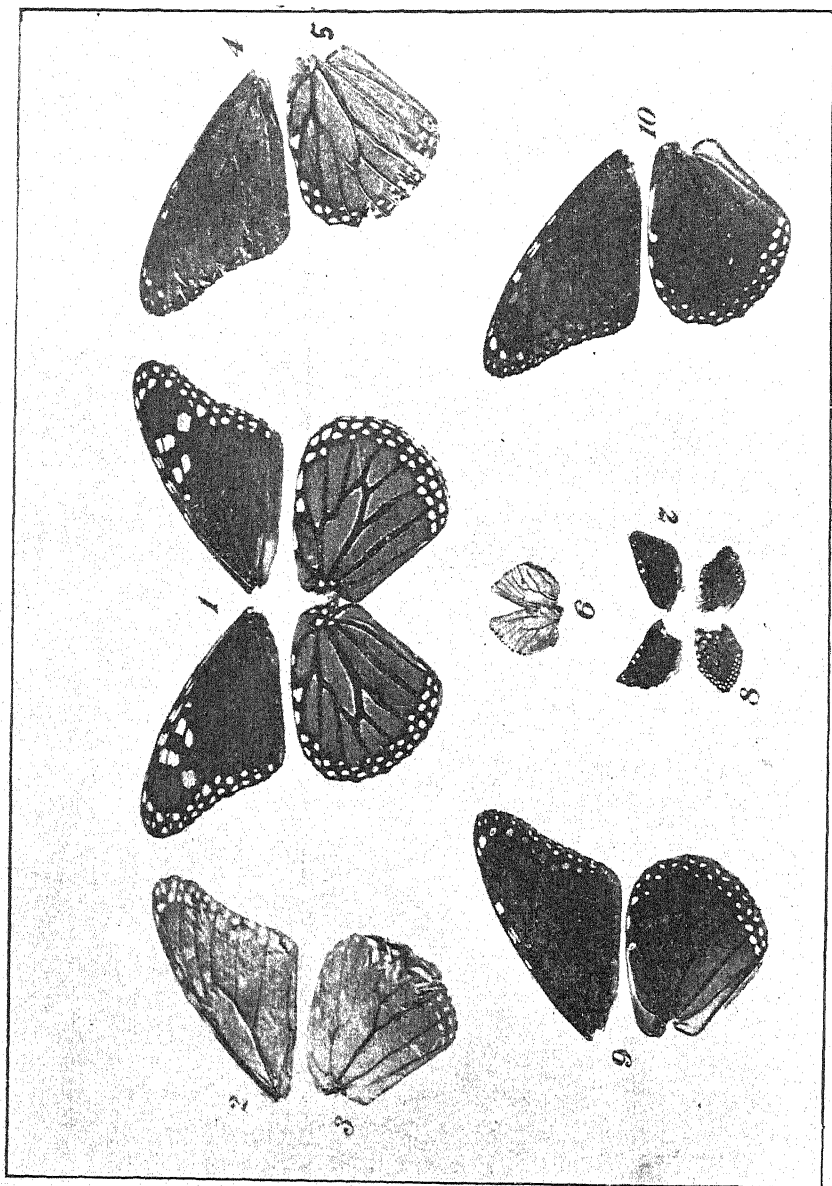
3. Ocelli present, scutellum smooth, bearing a row of bristles in front of the hind margin, the latter bare *Ornithomyia*, Latr.
 Ocelli wanting, hind margin of scutellum roughened with many nearly vertical ridges and fringed with bristles, scutellum otherwise bare.
 (Type: *Ornithomyia fulvifrons*, Walk.)... *Stilbometopa*, n. gen.
4. Anterior angles of thorax projecting forward in the form of long tubercles.....5.
 Anterior angles of thorax rounded..... *Hippobosca*, Linn.
5. Clypeus one-half as long as the middle of the front, scutellum bearing a stout bristle near each lateral margin. *Olfersia*, Wied.
 Clypeus almost as long as the front, scutellum bare. (Type: *P. maculata*, n. sp.)..... *Pseudolfersia*, n. gen.

Pseudolfersia maculata, n. gen. et sp. Front yellowish brown, the polished lateral margins and vertical triangle dark brown, the latter tapering anteriorly, broadly rounded at the tip, almost reaching the lower end of the front, a black bristle each side of the vertex and a row of smaller yellow ones on each side of the lower two-thirds of the front inside of the polished lateral margins; clypeus brown, yellowish medially, polished, noticeably longer than broad, notched in the middle of the apex and sulcate in the middle, the sulcus terminating in a deep fovea near the base of the clypeus; antennæ brown, subovate but flattened above, lying in deep grooves, not reaching apex of the clypeus, polished except the inner portion of its upper side which is opaque gray pruinose, bearing toward its apex a few yellow hairs and many long black bristles; palpi brown projecting slightly more than their greatest width beyond the apex of the clypeus; under side of the head brown, a yellow median longitudinal sulcus, and a rather large white lobe at its anterior end. Thorax dark brown, polished, the humeral tubercles apically yellow, a spot at inner side of each, another a short distance back of it, a stripe reaching from the prothoracic stigmata to base of wing, the transverse suture and a pair of spots on the posterior end of the thorax opaque gray pruinose, no median longitudinal sulcus, the transverse sulcus interrupted in the middle; pleura thinly gray pruinose except three spots along the suture in front of wings, sternum polished except its extreme anterior end which is gray pruinose; scutellum polished brown, truncate posteriorly, bare except a short pubescence along the posterior margin. Abdomen opaque grayish brown, the apex and venter yellow. Wings smoky brown, apex of auxiliary vein slightly beyond apex of second basal cell, that of first vein slightly beyond apex of first basal cell, of the second vein nearly midway between the apices of the first and third veins; first two sections of fourth vein subequal in length. Legs polished brown, front coxæ anteriorly opaque gray pruinose, pulvilli yellow, basal tooth of each tarsal claw yellowish. Length 7 to 8 mm. Wisconsin, on a Loon; also without indication of locality, on an Osprey, *Pandion haliaetus carolinensis*. April 30, 1883. Nine specimens. Type No. 4211, U. S. Nat. Museum.





THE WING STRUCTURE OF AN ARCHIPPUS BUTTERFLY.



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No. 12.

BUTTERFLY WING STRUCTURE.

BY J. ALSTON MOFFAT, LONDON, ONT.

Since the season of 1894 (when I first discovered that the upper and lower membranes of a butterfly's wing could be separated), I have had a desire to test the accuracy of the conclusions reached by me at that time ; so with the remarkable profusion of *Anosia (Danaïs) Archippus*, Fab., in the season of 1899, I was able to secure such an abundance of material to work with that I could repeat the observations until every doubt was satisfactorily settled. I shall only give here a brief statement of results reached, as a full account of the various processes will be published in the forthcoming Annual Report of the Society for 1899.

When a wing is fully expanded, and for an hour or two after, the membranes can be easily separated. Entrance for a pin-point between them is to be found at the base of the wing where the subcostal and median nervures come close together. The membranes are united at the costal and inner edges, which have to be cut to get them apart ; but they are free at the outer angle. At that time the nervures are in two parts, half in one membrane and half in the other, and open in the centre. The fluid which has been stored up in the pupa enters the winglet at the opening referred to, expanding the membranes as it passes along between them, and the nervures at the same time, and when it has extended to every portion of the wing, then it is fully expanded. The expanding fluid is of a gummy consistency, and as it dries, cements the membranes together, also the edges of the half-nervures, and produces the hollow tubes with which we are so familiar. The photograph for the plate was taken by Mr. R. W. Rennie, of this city, and is an admirable example of amateur photography.

DESCRIPTION OF PLATE 6.

Fig. 1 shows the inner sides of upper and lower membranes of a front and hind wing.

Fig. 2 is the inner side of an under membrane of a front wing.

- " 3 is the inner side of an upper membrane of a male hind wing, disclosing the inner side of the black sexual spot.
- " 4 is the inner side of an upper membrane of a front wing.
- " 5 is the inner side of the lower membrane of a female hind wing.
- " 6 shows inner sides of both membranes of a winglet, united at the base. Its exact length is five-eighths of an inch.
- " 7 gives a view of a perfect front winglet. The opposite one is incomplete.
- " 8 is the under surface of a hind winglet. The opposite one is the upper surface of another. Both imperfect.
- " 9-10 are the wings of one butterfly. Length, from base to apex, two inches; width at outer angle, one inch and a quarter.

The membranes at Fig. 1 were separated under water, and the gummy fluid on their inner sides washed off clean. Those at Figs. 2, 3, 4 and 5 were separated without the use of water, the expanding fluid being allowed to dry on, producing the appearance of a thin coat of varnish spread over the whole inner sides of the membranes.

ON THE CLASSIFICATION OF BEES.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

During the last winter, in connection with the study of the local bees, I had occasion to write out my views in regard to their classification, basing my observations upon the recent *Apidæ* catalogue of Della Torre. As the views then arrived at form a fair statement of my present opinions, I venture to offer them in connection with the recent paper of Mr. Ashmead on the classification of the bees.*

In the arrangement of these insects I attach the most importance to the venation, since it is hardly subject to modifications connected with changes of habit, and shows the least tendency to variation. In the lower bees the first submarginal cell is about as long as the second and third together, and its shortening may be regarded as a specialization. In the more highly specialized venation the marginal cell is truncate or has its apex more remote from the border of the wing. In a similar way a small stigma may be regarded as a characteristic of the more highly

*Trans. Am. Ent. Soc., XXIV, 49-100, 1899.

specialized venation. The most plastic characteristic of the venation is the reduction of the submarginal cells from three to two. This occurs by the obliteration of the first or second transverse cubitals or their coalescence.

I have examples of the following bees in which the first transverse cubitus is wanting: *Sphecodes confertus (falcifer)*, 4 spec., both wings; *S. mandibularis*, 2 spec., both wings; *S. antennarise*, 2 spec., both wings, 1 spec. one wing; *Augochlora confusa*, 1 spec. one wing; *Andrena claytoniae*, 1 spec., one wing; *Nomada Cressonii*, 1 spec., both wings; *N. oblitterata*, 15 spec., both wings, 6 spec. one wing. Examples of the following species have the second transverse cubitus wanting: *Sphecodes antennarise*, 1 spec., one wing; *Augochlora confusa*, 1 spec., one wing; *Andrena platyparia*, 1 spec., both wings; *A. solidaginis*, 1 spec., one wing; *A. bipunctata*, 1 spec., one wing; *A. Forbesii*, 1 spec., one wing; *A. claytoniae*, 3 spec., both wings, 1 spec. one wing; *Nomada Sayi*, 1 spec., one wing. Of the nine specimens of *Sphecodes*, all have the first transverse cubitus wanting, one of these having the second obliterated in the other wing. Of the eight specimens of *Andrena*, all have the second transverse cubitus wanting, one of these having the first obliterated in the other wing. Of twenty-two specimens of *Nomada oblitterata*, only one has three submarginal cells in both wings. *Halictus anomalus* and *H. lustrans* (*Hemihalictus lustrans*, Ckll., = *Dufourea lustrans*, Ashm.) I regard as anomalous species of *Halictus* in which the second transverse cubitus is wanting.

As far as I know there is no bee with three submarginal cells in which the first recurrent nervure enters the first submarginal cell, or is interstitial with the first transverse cubitus. When the first submarginal is long, the second quite short, and the first recurrent nervure enters the first, or is interstitial, the first submarginal cell is composite, the next is the third, and the dividing nervure is the second transverse cubitus. I consider that the first transverse cubitus is regularly wanting in *Prosopis*, *Panurginus* and *Neopasites*.

When the submarginal cells are of nearly equal length, and the second receives both recurrent nervures (the first recurrent being rarely interstitial, or nearly so), the first cell is normal, the next is composite, and the dividing nervure is the first transverse cubitus. The second transverse cubitus is regularly wanting in *Parandrena*, *Biareolina*,

Halictoidinæ, Macropis, Panurginæ except *Panurginus*, *Megachilinæ, Eucera, Ammobates, Pasites, Biastes*.

In *Perditinæ* the long submarginal cell is the first, the next is the third, and the dividing nervure is formed by the coalescence of the first and second transverse cubitals.

These three types of venation are no evidence of affinity, but must have had an independent origin from wings with three submarginal cells.

Characters connected with nectar-sucking, pollen-collecting, and the inquiline habit are, as compared with the venation, more physiological. They no doubt usually indicate relationship, but they often obscure it. I think they may be relied upon when they are confirmed by the venation. On the other hand, when the venation indicates relationship it is hard to disprove it by evidence drawn from the tongue, pollen scopæ, and characters connected with the inquiline habit. If the venation is of a low type, such as that of *Andrena* or *Halictus*, I think the genus should be assigned to a low position in spite of the tongue and scopæ. Usually specializations of venation, tongue and scopæ go hand in hand, but often they do not. A slightly specialized tongue may go with a highly specialized scopa, as in *Macropis*. Or a slightly specialized scopa may go with a highly specialized tongue, as in *Ceratina*. In such cases I assign the bee to a low or high position according to the character which seems to be supported by the venation.

To my mind the most egregious errors in the classification of bees seem to be in the location of the inquilines. The analogy of the case of *Bombus* and *Psithyrus* seems to me of prime importance in the solution of the question. No one doubts that they are more closely related to each other than either is to any host bee or any inquiline. The only differences *Psithyrus* shows are such as are correlated with the inquiline habit. Della Torre's last subfamilies of bees are: 12 *Bombinæ*; 13 *Psithyrinæ*, 14 *Apinæ*. To give *Psithyrus* this rank, I think, involves a great systematic error only equalled in the old physiological classification of Shuckard. The latter author calls those bees which carry pollen on their legs scopulipedes; those with abdominal brushes, dasygasters. Under *Nudipedes* he includes all British bees without scopæ, except *Prosopis*, *Sphecodes*, and *Psithyrus*. But *Coelioxys* and *Stelis* are developed from nudigasters and are related to the *Megachilinæ*. Della

Torre's subfamily 11 is *Coelioxynæ*, including *Coelioxys*, which I regard as a nudigaster, and *Anomobates*, which I regard as a nudipede.

From the analogy of *Bombus* and *Psithyrus*, I claim that *Coelioxys* is related to *Megachile*, *Stelis* to *Anthidium*, *Melecta* to *Anthophora*, *Nomada* to *Andrena*; not only, however, on this analogy, but also on morphological grounds, from the venation and other characters.

Assuming that the inquilines arose from some of their hosts, as is certain in the case of *Bombus* and *Psithyrus*, we would expect the most resemblance between host and inquiline in the recent cases of the highly specialized bees, as *Bombus* and *Psithyrus*, and the least in the oldest cases of the least specialized bees, as *Andrena* and *Nomada*.

In Della Torre's classification, as above stated, *Psithyrus* follows *Bombus*, though in different subfamilies. I would give *Psithyrus* the same position, but put both in the same subfamily. *Stelis* follows *Anthidium* in a separate subfamily, whence I would remove it to follow *Megachile* in *Megachilinæ*. Also *Melecta* and *Epeolus* follow *Anthophora*, but in a separate family. I would separate *Anthophora* from *Mellissodes*, etc., and put *Melecta* and *Epeolus* with it.

Nomada must seem the most far-fetched of my cases. Although it has a long first discoidal cell, I think other characters of the venation separate it far from *Melecta* and *Epeolus*, especially the large stigma and pointed marginal cell. I think *Nomada* is an ancient offshoot from *Andrena*, and is not related to any other genus. Its differences from *Andrena* and resemblances to other bees I hold are acquired, not inherited. After *Andrena* I would place *Parandrena*, a more recent offshoot, and then write *Nomada*.

In this connection I think the taxonomic proposition will hold that an offshoot from a certain group is related to that group. It may acquire resemblances to the other forms, but not relationship.

That Mr. Ashmead is right in interpolating the inquiline bees among the host bees is no doubt correct, but this has been done by Della Torre to such an extent as to destroy the contrast which exists between Mr. Ashmead's arrangement and the old-fashioned and unnatural arrangement of Schmiedeknecht. As in the Della Torre arrangement, I hold that Mr. Ashmead does not go far enough; indeed, it seems to me that he refutes his own scheme by the very arguments which he cites in defence of it. In his section III. Schmiedeknecht arranges certain bees whose differences

from other bees and resemblances among themselves are associated with the inquiline habit, ignoring the characters which indicate their true relationship. Mr. Ashmead's arrangement of those bees seems to me to illustrate the same kind of taxonomy. If, according to Mr. Ashmead, the inquilines can not form a natural group of Apidæ parasiticæ on account of their varied relationships to other bees, how can *Coelioxys*, which he admits is derived from *Megachile*, and *Stelis*, which he admits is derived from *Anthidium*, form a natural family of *Stelidæ*? In the same line is the reference of all of the inquilines to separate families. Even *Psithyrus* is referred to a special family and separated from the Bombidæ by the interpolation of another family.

Mr. Ashmead's remarks regarding *Macropis* and the Panurgidæ have no significance, in view of the fact that he admits that Panurgidæ is not a natural group; but how can recent offshoots from *Andrena* and *Halictus* and offshoots from Anthophidæ form a natural family? What is to keep a recent offshoot from *Andrena* from being related to *Andrena*? The two submarginal cells can, as I have observed above, be shown to be of three types, all of which must have had an independent origin from bees with three submarginal cells.

The resemblance between the tongues of *Colletes* and *Prosopis* seems to me to be uninherited and misleading. I would follow Schmiedeknecht in arranging *Colletes*.

The arrangement of the inquiline bees with the host-bees will make it a little more difficult to define the groups, and will give some trouble to amateurs who lack an elementary knowledge of morphology. But it will bring us down to the consideration of the characters which are the most important clues to relationship.

I shall now offer what seems to me the most natural arrangement of the local bees:

- (1) *Andrenina*: *Andrena*, *Parandrena*, *Nomada*, *Colletes*, *Nomia*.
- (2) *Prosopidina*: *Prosopis*.
- (3) *Halictina*: *Sphcodes*, *Halictus*, *Augochlora*, *Agapostemon*.
- (4) *Halictoidina*: *Halictoides*.
- (5) *Melittina*: *Macropis*.
- (6) *Panurgina*: *Pseudopanurgus*, *Calliopsis*.
- (7) *Perditina*: *Perdita*.

- (8) *Megachilinae*: Andronicus, Alcideamea, Osmia, Heriades, Megachile, Coelioxys, Anthidium, Stelis.
 (9) *Ceratininae*: Ceratina.
 (10) *Melissodinae*: Synhalonia, Xenoglossa, Melissodes, Entechnia, Emphor.
 (11) *Xylocopinae*: Xylocopa.
 (12) *Anthophorinae*: Anthophora, Clisodon, Habropoda, Bombomelecta, Melecta, Epeolus, Neopasites.
 (13) *Bombinae*: Bombus, Psithyrus.
 (14) *Apinae*: Apis.

It seems to me that Mr. Ashmead's classification is an improvement on that of Della Torre: in placing *Sphecodes* near *Halictus*; in separating *Colletes* from *Prosopis*, as far as he goes; in giving a lower position to Megachilidae, which the long first submarginal cell clearly supports, and in separating *Ceratina* from *Xylocopa*.

In placing *Colletes* with Andreninae I mean to emphasize the importance of the venation, facial foveae and pollen-apparatus against the form of the tongue.

At present I do not accept *Pseudopanurgus* as a synonym of *Panurginus*. I refer to it *Scrapter andrenoides* Sm., *Calliopsis albitarsis* Cr., *asteris*, *labrosus*, *rudbeckiae*, *parvus*, *compositarum*, *solidaginis*, *rugosus*, and *Panurginus labrosiformis*.

The genera Mr. Ashmead refers to Panurgidae, I would arrange in the following way, excepting those of which I have not seen examples:—*Andreninae*: Andrena (= Biareolina, Parandrena); *Halictinae*: Halictus (incl. Dufourea Ashm., Hemihalictus Ckll.); *Halictoidinae*: Dufourea, Halictoides, Rhophitoides, Rhophites; *Melittinae*: Macropis; *Dasy-podinae*: Dasy-poda; *Panurginae*: Panurgus, Panurginus (= Scapteroides), Pseudopanurgus, Epimethea, Camptopocum, Calliopsis; *Perditinae*: Perdita, etc.

CORRIGENDA.

Page 8, first line of description of *Psilopa petrolei*, erase the comma after the word "coloured."

Page 100, lines 15 and 9 from bottom; page 111, line 6 from top; and page 112, lines 4 and 19 from top: for *Lasius Americanus*, *Gm.*, read *Em.*

Page 112, line 12 from bottom, for "Australia to Japan," read "Australia and Japan."

Page 335, last line, for "*Anthoica*?" read "*Ornithoica*."

ERRATUM—Page 332, line 8 from top, for "wings" read "twigs."

NOTES ON PHILANTHUS.

BY S. N. DUNNING, HARTFORD, CONN.

In the CANADIAN ENTOMOLOGIST, 1899, p. 293, ff., Mr. Ashmead has divided, first *Aphilanthops* into *Clypeadon*, Patton, and *Aphilanthops*, Patton, and secondly *Philanthus* into *Epiphilanthus*, *Pseudanthophilus*, *Anthophilus*, and *Philanthus*.

(i.)

Mr. Patton describes *Clypeadon* in *Entomological News*, 1897, p. 13, as separated from *Aphilanthops* by its "dorsal valve subquadrate, ventral valve bilobate." *A. quadrinotatus*, Ash., ♀, presents both these characters; *A. elsiæ*, Dunn, ♀, the latter, the other forms not at all. The other characters given by Mr. Ashmead are not sufficient to make a new genus. I am therefore forced to conclude that *Clypeadon* is not valid.

(ii.)

Under (4), page 294, above cited, Mr. Ashmead divides *Philanthus* into *Philanthus* (6) and three new genera (5). While the difference in the eye-emargination exists, it is not true of the division here made. Neither does the division on the venation of the hind wing hold. The one character left is in the punctuation of the abdomen. This is an insufficient foundation for new genera.

(iii.)

A consideration of the characters given under (5), page 294, and based on *Phil. solivagus* ♂ ♀, *P. ventilabris* ♂ ♀, and *P. politus* ♀, gives me the following result:

(i.) There is no difference whatsoever, in so far as I can detect, between the relative lengths of median and submedian cells on the externo-medial nervure.

(ii.) The distance on the cubital nervure, between the junction of the 2nd transverso-cubital nervure and the 2nd recurrent nervure, is less in *solivagus* than in *ventilabris* or *politus*, but that does not change the relative lengths of 2nd and 3rd submarginal (or cubital) cells on the 2nd transverso-cubital nervure (which I take "radius" to mean).

(iii.) While the abdominal segments (excepting the 1st) are less constricted in *solivagus* than in *ventilabris* or *politus*, nevertheless the constriction is there.

As regards the *Pseudanthophilus* and *Anthophilus*, I find clypeus margined in both species cited as types, that the junction of 1st recurrent nervure varies in both species anywhere from the middle to the quarter of the second submarginal cell, and that the one character separating them lies in the last joint of the ♂ antennæ. These cannot, therefore, be considered valid genera.

CLASSIFICATION OF THE ENTOMOPHILOUS WASPS, OR THE SUPERFAMILY SPHEGOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS,
U. S. NATIONAL MUSEUM.

(Paper No. 7.—Conclusion.)

FAMILY XXIV.—Stizidæ.

This family has been associated usually, as a tribe, with the family *Bembicidæ*, with which, however, according to my views, it has no relationship whatever. It is in reality much closer allied to the *Nyssonidæ*, next to which I have placed it, and from which some of the species are separated with difficulty.

The characters made use of in my table of families will, however, I think, readily separate these three families, and it is unnecessary to repeat them here.

Gorytes moneduloides, Packard, belongs to this family and not to the *Nyssonidæ*, and, as well as I can make out from the description, represents Costa's genus *Ammatomus*. Its entire habitus—the large eyes, the free, almost semicircular labrum, etc.—is that of a Stizid and not of a Nyssonid, and I feel satisfied it belongs here, although, not having seen an authentic specimen of *Ammatomus*, Costa, I may be wrong in assigning it to that genus.

Exeirus, Shuckard, and *Kohlia*, Handlirsch, are included in this family from the descriptions and figures alone, since both are unknown to me in nature.

The genera *Stizoides*, Guérin, and *Megastizus*, Patton, were suppressed by Handlirsch and Kohl, and included with *Stizus*, Latreille. Fox has followed them in this, but, according to my views, all these are good and distinct genera, and I have here restored *Stizoides* and *Megastizus* to their original standing.

It is believed that the following table will enable the student to recognize all of these genera without any difficulty :

Table of Genera.

Marginal cell much shorter than the first cubital cell, rounded at apex ;
pygidial area in ♀ wanting or incompletely defined ; abdomen in ♂
ending in 3 spines.....4
Marginal cell as long or much longer than the first cubital cell.

- Second cubital cell *not* petiolate, receiving both recurrent nervures. 2.
 Second cubital cell petiolate, oblong, in outline almost elliptical, and receiving both recurrent nervures; cubitus in hind wings originating a little beyond the transverse median nervure or almost interstitial.....Exeirus, Shuckard.
2. Marginal cell lanceolate, *without* an appendage; submedian cell longer than the median.....3.
 Marginal cell at apex slightly rounded, *with* an appendage; submedian cell a little shorter than the median.
 First transverse cubitus broken by a stump of a vein a little before the middle; hind wings with the cubitus originating much before the transverse median nervure. Kohlia, Handlirsch.
3. Marginal cell almost twice as long as the first cubital cell, or at least one and a half times as long; pygidial area in ♀ distinct, triangular; anterior tarsal joints 2-4 short, transverse.
 Cubitus in hind wings originating from about the apical third of the submedian cell; second cubital cell, along the cubitus, fully four times or more longer than along the radius; antennae longer than the head and thorax united, subclavate; abdomen in ♂ ending in a single spine. Species large...Sphecius, Dahlbom.
 Cubitus in hind wings originating from the apical sixth of the submedian cell; second cubital cell, along the cubitus, scarcely three times as long as along the radius; antennae shorter than the head and thorax united, strongly clavate; abdomen in ♂ ending in two short teeth.....Ammatomus, Costa.
- Marginal cell not much longer than the first cubital cell; cubitus in hind wings originating a little before the transverse median nervure, or almost interstitial; abdomen in ♂ unarmed (♀ unknown).....Handlirschia, Kohl.
4. Cubitus in hind wings originating far *before* the transverse median nervure, or never beyond the apical third of the submedian cell; mandibles simple; intermediate tarsi longer than their tibiae, the joints 3-4 short, lobed; claws long, the pulvilli moderate.....Stizoides, Guerin.
 Cubitus in hind wings originating at about the apical fifth of the submedian cell; mandibles dentate or simple.

Anterior and intermediate tarsi short, not longer than their tibiæ, the joints 2-4 very short, wider than long, and lobed; the pulvilli very large; posterior face of metathorax not deeply impressed, the lateral angles not sharp, rounded and without a deep emargination; last joint of antennæ in ♂ slightly bent, truncate at apex, the antepenultimate and penultimate joints normal.....Megastizus, Patton.

Anterior and intermediate tarsi always distinctly longer than their tibiæ, the joints 2-4 short, but, except sometimes the fourth, not lobed; posterior face of metathorax deeply impressed, the lateral angles or ridges sharp, and with a deep emargination; second cubital cell triangular, always narrowed to a point or nearly above, and often petiolate; last two joints of antennæ in ♂ curved, the last pointed or ending in a slight spine, the antepenultimate joint *beneath at apex*, ending in a small spine.....Stizus, Latreille.

= Bembecinus, Costa.

= Stizomorpha, Costa.

North American Species.

- | | |
|-------------------------------|--------------------------------|
| (1) EXEIRUS, Shuckard. | (7) MEGASTIZUS, Patton. |
| (2) KOHLIA, Handlirsch. | (1) M. brevipennis, Walsh, ♀ ♂ |
| (3) SPHECIUS, Dahlbom. | (2) M. texanus, Cr., ♀ ♂. |
| (1) S. speciosus, Drury, ♀ ♂. | (8) STIZUS, Latreille. |
| (2) S. corvallis, Patt., ♀ ♂. | (1) S. Godmani, Cam. |
| (3) S. Hogardii, Latr., ♀ ♂. | (2) S. nanus, Handl. |
| (4) S. grandis, Say, ♀ ♂. | (3) S. flavus, Cam. |
| (5) S. fervidus, Cr., ♀ ♂. | var. subalpinus, Ckll. |
| (6) S. nevadensis, Cr., ♀. | (4) S. Servillei, Lepel. |
| (7) S. raptor, Handl. | (5) S. xanthochrous, Handl. |
| (4) AMMATOMUS, Costa. | (6) S. moneduloides, Cr., ♀ ♂. |
| (1) A. moneduloides, Pack. | (7) S. neglectus, Smith, ♂. |
| (Gorytes) ♀ ♂. | (8) S. lineatus, Cr., ♂. |
| (5) HANDLIRSCHIA, Kohl. | |
| (6) STIZOIDES, Guérin. | |
| (1) S. uncinata, Say, ♀ ♂. | |

FAMILY XXV.—Sphegidae.

This family is readily distinguished from all of the previously

described families in the Sphegoidea, by having the abdomen distinctly petiolated, and the totally different habitus.

In having a petiolate abdomen it agrees with the family *Ampulicidæ*, but otherwise it is quite distinct, and is readily separated from it by the normally shaped mesosternum, which is never produced posteriorly into a forked process, and by the clypeus not being produced posteriorly between the antennæ, the latter being always inserted *above* the base of the clypeus.

The family, as here restricted, may be separated into four natural groups, which I have designated as subfamilies, and which may be recognized by the use of the following table :

Table of Subfamilies.

Second cubital cell receiving both recurrent nervures, or the second recurrent nervure is interstitial *with* the second transverse cubitus, although sometimes the first recurrent is interstitial with the first transverse cubitus, or then received by the first cubital cell ; tibiæ either spinous or entirely smooth without spines. 2.

Second cubital cell receiving only one recurrent nervure—the first ; second recurrent nervure received by the third cubital cell, or at least beyond the second transverse cubitus ; very rarely are both recurrent nervures received by the first cubital cell (Neosphex, Reed, = Pseudosphex, Tischb.).

Antennæ inserted on the middle of the face ; claws with 1 to 5 teeth beneath ; tibiæ *strongly spinous*, or at least never with weak or feeble spines ; tarsal comb in ♀ always present ; cubitus in hind wings most frequently interstitial, or nearly, with the transverse median nervure ; head transverse. Subfamily I., Spheginæ.

Antennæ inserted far anterior to the middle of the face ; claws simple, *without* teeth, or at most with a single small tooth near the middle ; tibiæ *smooth*, not spinous ; tarsal comb in ♀ *never* present ; cubitus in hind wings interstitial. . Subfamily IV., Podiinae.

2. Claws simple, *without* a tooth beneath ; tibiæ more or less spinous ; tarsal comb in ♀ present ; abdomen most frequently very elongate, the petiole composed of 2 *joints*, rarely with only 1 *joint* ; cubitus in hind wings usually originating *beyond* the transverse median nervure. Subfamily II., Ammophilinae.

Claws with a single tooth beneath, although sometimes very minute, more rarely without a tooth, the claws simple; tarsal comb in ♀ wanting; abdomen always with a 1-jointed petiole; cubitus in hind wings interstitial.

Antennæ inserted on the middle of the face; metathorax *with* a large U-shaped area above; mesopleura not longer than the height of the thorax. Subfamily III., Sceliphroninæ.

Antennæ inserted far anterior to the middle of the face, *on* or just above an imaginary line drawn from base of eyes; metathorax *without* a large U-shaped area above; mesopleura much longer than the height of the thorax. Subfamily IV., Podiinæ.

SUBFAMILY I.—Spheginæ.

In this group, or subfamily, the second and third cubital cells, in the front wings, each receive a recurrent nervure, or both recurrent nervures are received by the first cubital cell; the antennae are inserted on the middle of the face; the tibiæ are strongly spinous; the anterior tarsi in the ♀ always provided with a tarsal comb; while the claws are never simple, being always armed with from 1 to 5 teeth.

Some of the genera falling in this group are quite closely allied and difficult to separate, but it is believed all can be easily separated with the use of the following table:

Table of Genera.

Front wings with three cubital cells, the second and third each receiving a recurrent nervure. 2.

Front wings with only two cubital cells, the first receiving both recurrent nervures; marginal cell short, rounded at apex; median and sub-median cells equal; cubitus in hind wings originating *beyond* the transverse median nervure; claws with 2 blunt teeth beneath. Neosphex, Reed.
= Pseudosphex, Tischb.

2. Second cubital cell wider (higher) than long. 4.
Second cubital cell as long or longer than wide (high), rhomboidal or rectangular. 3.

3. Head normal, transverse, pronotum shorter than the mesonotum or no longer; claws with 2 teeth beneath.

Clypeus anteriorly truncate, usually with a reflexed rim and without a median emargination (rarely dentate); scutellum and

- postscutellum most frequently *with* a median longitudinal furrow or depression, or at least one or the other with such a furrow, rarely simple.....Sphex, Linne.
- Clypeus anteriorly *with* a median emargination or incision; scutellum and postscutellum normal, *without* a median longitudinal furrow.....Isodontia, Patton.
4. Claws with only one tooth beneath.....5.
Claws with 2-5 teeth beneath.....6.
5. Species metallic blue or violaceous; marginal cell at apex narrowly rounded; cubitus in hind wings *interstitial* with the transverse median nervure; mandibles not especially long; tibiæ more sparsely and feebly spined; maxillary palpi 6-jointed; labial palpi 4-jointed.....Chlorion, Latreille.
- Species, except sometimes the abdomen, not metallic; marginal cell at apex truncate or broadly rounded; cubitus in hind wings originating *beyond* the transverse median nervure; mandibles unusually long; tibiæ in ♀ strongly spined; maxillary palpi 6-jointed; labial palpi 5-jointed.....Pronaeus, Latreille.
6. Last ventral plate in ♀ compressed, almost carinate; claws with 2 teeth.....7.
Last ventral plate in ♀ convex, not compressed; claws with 2-5 teeth beneath.....8.
7. Clypeus medially produced, with a deep sinus on each side.....Palmodes, Kohl.
Clypeus obtrapezoidal, truncate anteriorly, entire; eyes within parallel.....Calosphex, Kohl.
8. Claws with 2 teeth; clypeus convex, anteriorly subemarginate medially, without a reflexed rim; anterior tarsal comb short; transverse median nervure in hind wings short.. Harpactopus, Smith.
Claws with 3 to 5 teeth; clypeus subconvex, with a more or less distinct reflexed rim anteriorly; anterior tarsal comb long.
Claws with 3-4 teeth; clypeus anteriorly slightly rounded, and not at all, or only slightly, emarginate; transverse median nervure in hind wings curved or somewhat curved, the cubitus *interstitial*, or nearly, with it....Parasphegus, Smith.
Claws with 4-5 teeth; clypeus anteriorly truncate, with a median emargination; cubitus in hind wings originating *beyond* the

transverse median nervure, the latter being straight ; mandibles in ♀ 3-dentate, in ♂ 2-dentate Priononyx, Dahlb.

SUBFAMILY II.—Ammophilinæ.

The species falling in this group are much more slender and elongate than those of the other groups, and are at once distinguished by the *simple, unarmed* claws, and by the venation of the wings ; the second cubital cell in the front wings always receives both recurrent nervures, while the cubitus in the hind wings originates *beyond* the transverse median nervure. The tarsal comb in the ♀ is always present.

Two other subfamilies—*Sceliphroninæ* and *Podiinæ*—have both recurrent nervures received by the second cubital cell ; but in these families the claws are armed with a tooth beneath, the tarsal comb in the ♀ is always wanting, while the cubitus in the hind wings is interstitial with the transverse median vein.

Only four genera fall into this family, distinguished as follows :

Table of Genera.

Front wings with two cubital cells 2.

Front wings with three cubital cells ; submedian cell a little shorter than the median.

Petiole of abdomen not especially long, 1-jointed, the second segment campanulate ; clypeus in ♀ with a more or less distinct median emargination Psammophila, Dahlb.

Petiole of abdomen very long, 2-jointed, the second segment being elongate and slender, forming with the first a long petiole.

Third cubital cell not petiolate Ammophila, Kirby.

Third cubital cell petiolate Miscus, Jurine.

2. Petiole long, 2-jointed, as in *Ammophila* ; submedian cell as long as the median Caloptera, Fabricius.

SUBFAMILY III.—Sceliphroninæ.

In having both recurrent nervures received by the second cubital cell, this subfamily approaches the *Ammophilinæ*, but it is readily separated from it by the claws having, as a rule, a single tooth beneath ; by the cubitus in the hind wings being interstitial with the transverse median nervure, and by the ♀ always being without a tarsal comb.

From the *Podiinæ* it is separated by the antennæ being inserted on the middle of the face, by the large U-shaped area on the metathorax or middle segment, and by the much shorter mesopleura.

Only two genera are known, distinguished as follows :

Table of Genera.

Second submarginal cell receiving both recurrent nervures.

Species black and yellow, not metallic ; clypeus flat, at apex *bidentate* ; transverse median nervure in front wings *not* interstitial with the basal nervure, but uniting with the median vein a little *before* the origin of the basal nervure ; petiole of abdomen about twice as long as the metathorax *Sceliphron*, Klug.
= *Pelopæus*, Latr.

Species metallic blue or violaceous ; clypeus anteriorly *3-dentate* ; transverse median nervure in front wings *interstitial* with the basal nervure ; petiole of abdomen not or scarcely longer than the metathorax *Chalybion*, Dahlb.

SUBFAMILY IV.—Podiinae.

This subfamily comes nearest to the *Sceliphroninae*, but is at once separated by the antennæ being inserted on the anterior part of the face, *on or just above* an imaginary line drawn from the base of the eyes ; by the much longer mesopleura, and by the absence of a large U-shaped area on the metathorax or middle segment.

Three genera are known, separated as follows :

Table of Genera.

First and second cubital cells each receiving a recurrent nervure, or the *first* recurrent is interstitial with the *first* transverse cubitus 2.

Second and third cubital cells each receiving a recurrent nervure, or the *second* recurrent is interstitial with the *second* transverse cubitus 3.

Second cubital cell receiving both recurrent nervures . . *Podium*, Fabricius.

2. Second cubital cell wider than long ; hind femora, in both sexes, normal, the basal joint of their tarsi much shorter than their tibiæ ; petiole long or longer than the metathorax . . *Podium*, Fabr. (pars.)

Second cubital cell longer than wide ; hind femora in ♀ dilated at apex, their tibiæ shortened, the basal joint of their tarsi as long, or nearly, as the tibiæ ; petiole shorter than the metathorax. *Stethrorectus*, Smith.

3. Head in outline as seen from above, triangular, much produced behind, the temples oblique, but broad ; pronotum conically produced, longer than the meso- and meta-notum . . *Trigonopsis*, Perty.

North American Species.

- (1) NEOSPHEX, Reed.
= PseudospheX, Tischb.
- (2) SPHEX, Latreille.
(1) *S. argentata*, Dahlb.
(2) *S. aurulentus*, Fabr.
(3) *S. beatus*, Cam., ♂.
(4) *S. Belfragei*, Cr., ♀.
(5) *S. brasiliensis*, Sauss., ♀.
? = *tinctipennis*, Cam.
(6) *S. caliginosus*, Erich.
(7) *S. chichimecus*, Sauss., ♂.
(8) *S. chrysophorus*, Kohl.
(9) *S. clavipes*, Kohl., ♀.
(10) *S. croesus*, Lepel.
(11) *S. crucis*, Fabr.
(12) *S. dubitatus*, Cr.
(13) *S. flavipes*, Smith.
(14) *S. habena*, Say.
(15) *S. ichneumonea*, Linné.
var. *dorsalis*, Lepel.
(16) *S. lautus*, Cr.
(17) *S. mandibularis*, Cr.
(18) *S. Maximiliani*, Kohl.
(19) *S. mixtus*, Fabr.
(20) *S. pennsylvanicus*, Linné.
(21) *S. rufipes*, Lepel.
(22) *S. singularis*, Smith.
(23) *S. spiniger*, Kohl., ♂.
(24) *S. T.*, Beauv.
(25) *S. tepanecus*, Sauss.
(26) *S. texanus*, Cr.
(27) *S. vagus*, Drury.
- (1) *I. azteca*, Sauss.
= *macrocephalus*, Fox.
- (2) *I. costipennis*, Spin.
(3) *I. elegans*, Smith.
(4) *I. instabilis*, Smith.
(5) *I. lucæ*, Sauss.
(6) *I. philadelphica*, Lepel.
(7) *I. robusta*, Cam.
(8) *I. tibialis*, Lepel.
- (4) CHLORION, Latreille.
(1) *C. aerarium*, Patton.
(2) *C. coeruleum*, Drury.
(3) *C. columbianum*, Grib.
(4) *C. nearcticum*, Kohl.
= *coeruleum*, Auct., *pars*.
(5) *C. occultum*, Kohl.
= *coeruleum*, Auct., *pars*.
- (5) PRONÆUS, Latreille.
(6) PALMODES, Kohl.
(1) *P. dimidiata*, DeGeer.
= *abdominalis*, Cr.
(2) *P. morio*, Kohl.
(3) *P. praestans*, Kohl.
(4) *P. rufiventris*, Cr.
- (7) CALOSPHEX, Kohl.
(8) HARPACTOPUS, Smith.
H. laeiventris, Cr.
- (9) PARASPHEX, Smith.
(10) PRIONONYX, Dahlbom.
(1) *P. atratus*, Lepel.
(2) *P. bifoveolatus*, Tischb.
= *canadensis*, Prov.
= *thomæ*, Fabr., *pars*.
(3) *P. brunneipes*, Cr.
(4) *P. excisus*, Kohl.
(5) *P. ferruginosus*, Fox.
(6) *P. thomæ*, Fabr.

Subfamily II—*Ammophilinae*.(11) *PSAMMOPHILA*, Dahlbom.

- (1) *P. argentifrons*, Cr.
- (2) *P. collaris*, Cr.
- (3) *P. communis*, Cr.
- (4) *P. grossa*, Cr.
- (5) *P. luctuosa*, Smith.
- (6) *P. robusta*, Cr.
- (7) *P. ? violaceipennis*, Lepel.

(12) *AMMOPHILA*, Kirby.

- (1) *A. Alberti*, Hald.
- (2) *A. alpestris*, Cam.
- (3) *A. alticola*, Cam.
- (4) *A. anomala*, Taschb, ♀ ♂.
- (5) *A. arvensis*, Dahlb.
- (6) *A. atriceps*, Smith.
- (7) *A. aureonotata*, Cam.
- (8) *A. azteca*, Cam.
- (9) *A. barbata*, Smith.
- (10) *A. breviceps*, Smith.
- (11) *A. cementaria*, Smith.
- (12) *A. centralis*, Cam.
- (13) *A. ceres*, Cam.
- (14) *A. Championii*, Cam.
- (15) *A. chiriquensis*, Cam.
- (16) *A. comanche*, Cam.
- (17) *A. conditor*, Smith.
- (18) *A. consors*, Cam.
- (19) *A. cora*, Cam.
- (20) *A. dejecta*, Cam.
- (21) *A. extremitator*, Cr.
- (22) *A. femur-rubra*, Fox.
- (23) *A. ferruginosa*, Cr.
- (24) *A. Gaumeri*, Cam.
- (25) *A. gracilis*, Lep.
- (26) *A. Guerinii*, D. T.
- (27) *A. jason*, Cam.
- (28) *A. inepta*, Cr.

(29) *A. intercepta*, Lepel.(30) *A. iridipennis*, Cam.(31) *A. juncea*, Cr.(32) *A. macra*, Cr.(33) *A. mexicana*, Sauss.(34) *A. micans*, Cam.(35) *A. montana*, Cr.(36) *A. Montezuma*, Cam.(37) *A. Morrisonii*, Cam.(38) *A. nearctica*, Kohl.(39) *A. nigricans*, Dahlb.(40) *A. nigrocoerulea*, Cam.(41) *A. picipes*, Cam.(42) *A. pictipennis*, Wahn.(43) *A. placida*, Smith.(44) *A. polita*, Cr.(45) *A. procera*, Dahlb.(46) *A. pruinosa*, Cr.(47) *A. quadridentata*, Cam.(48) *A. saeva*, Smith. *(49) *A. sonorensis*, Cam.(50) *A. strenua*, Cr.(51) *A. striolata*, Cam.(52) *A. trichiosoma*, Cam.(53) *A. urnaria*, Dahlb.(54) *A. valida*, Cr.(55) *A. variipes*, Cr.(56) *A. volcanica*, Cam.(57) *A. vulgaris*, Cr.(58) *A. xanthoptera*, Cam.(59) *A. Yarrowii*, Cr.(13) *MISCUS*, Jurine.(14) *CALOPTERA*, Fabricius.(1) *C. Wrightii*, Cr., ♀ ♂.Subfamily III—*Sceliphroninae*.(15) *SCELIPHRON*, Klug.(1) *S. cementarius*, Drury.

- | | |
|-------------------------------------|------------------------------------|
| var. canadensis, Smith. | (2) <i>C. coeruleum</i> , Linné. |
| var. architectus, Lepel. | (3) <i>C. texanum</i> , Cr. |
| var. lucæ, Sauss. | (4) <i>C. Zimmermanni</i> , Dahlb. |
| var. flavipes, Fabr. | (5) <i>C. aztecum</i> , Sauss. |
| var. flavipunctum, Chrisb. | Subfamily IV— <i>Podiinae</i> . |
| var. flavimaculatum, DeGeer. (17) | PODIUM, Fabr. |
| var. jamaicensis, Fabr. | (1) <i>P. luctuosum</i> , Smith. |
| (2) <i>S. Servillei</i> , Lepel. | (2) <i>P. rufipes</i> , Fabr. |
| (3) <i>S. fasciatum</i> , Lep. | (3) <i>P. bellum</i> , Cam. |
| = <i>argentifrons</i> , Cr. | (4) <i>P. bugalense</i> , Cam. |
| (4) <i>S. annulatum</i> , Cr. | (5) <i>P. fulvipes</i> , Cr. |
| (5) <i>S. assimile</i> , Dahlb. | (6) <i>P. opalinum</i> , Smith. |
| (6) <i>S. argentispilus</i> , Prov. | (7) <i>P. petiolatum</i> , Drury. |
| (7) <i>S. tau</i> , D. T. | (18) <i>STETHRORECTUS</i> , Smith. |
| (8) <i>S. nigriventris</i> , Costa. | (19) <i>TRIGONOPSIS</i> , Perty. |
| (16) <i>CHALYBION</i> , Latreille. | (1) <i>T. violaceus</i> , D. T. |
| (1) <i>C. californicum</i> , Sauss. | |

FAMILY XXVI.—Ampulicidæ.

This family, in general appearance and in having a petiolate abdomen, is allied to the *Sphegidae*, but is readily separated by the mesosternum being produced into a forked process posteriorly, by the mesonotum having distinct parapsidal furrows, by the clypeus being produced posteriorly between the insertion of the antennæ, often rostrate or carinate, and by its metathoracic characters.

The species, so far as we know, prey upon cockroaches, and thus differ in their habits from the *Sphegidae*.

The family may be divided into two natural groups, which I have designated as subfamilies, and which may be distinguished by the use of the following table :

Table of Subfamilies.

- | | |
|---|-----------------------------|
| Marginal cell at apex acute, <i>without</i> an appendage ; metathorax posteriorly truncate or rounded, unarmed ; clypeus not carinate..... | Subfamily I., Dolichurinae. |
| Marginal cell at apex rounded, <i>with</i> an appendage ; metathorax posteriorly squarely truncate, the upper angles most frequently acute or toothed ; clypeus carinate..... | Subfamily II., Ampulicinae. |

SUBFAMILY I.—*Dolichurinae*.

This subfamily is easily distinguished from the *Ampulicinae* by a pointed, not truncate, marginal cell, by the non-carinate clypeus, and by the rounded, or at least unarmed, metathorax.

The group is unknown in our fauna, and is found principally in Australia, or at least in the Oriental region, only a single genus *Dolichurus* being found in Europe.

According to Kohl, *Dolichurus*, like *Ampulex*, preys upon Blattidæ, which they store up in their nests as food for their young.

Three genera fall into this subfamily, and may be recognized by the characters made use of in the following table :

Table of Genera.

Stigma not small, subovate ; submedian cell shorter than the median ; metanotum with foveolæ.....2.

Stigma small, poorly developed ; submedian cell shorter than the median ; metanotum with several longitudinal carinæ.

Third cubital cell smaller than the second, narrowed towards the radius ; cubitus in hind wings originating a little *before* the transverse median nervure, or interstitial ; metanotum above not broadened out laterally.....*Dolichurus*, Latreille.

Third cubital cell quadrangular, much longer than the second ; cubitus in hind wings originating beyond the transverse median nervure ; metanotum above broadened out

laterally.....*Tririgma*, Westw.

2. Second cubital cell subtriangular, smaller than the third ; cubitus in hind wings interstitial ; metathorax rounded posteriorly ; clypeus produced medially ; claws toothed.....*Aphelotoma*, Westw.

SUBFAMILY II.—*Ampulicinae*.

In this family the marginal cell is more or less rounded at apex, with an appendage ; the clypeus is subrostriform and carinate ; while the metathorax posteriorly is truncate, with the upper angles most frequently acute, toothed or produced into spines.

Kohl would restrict all the species to a single genus, *Ampulex*, Jurine, treating the others as sections ; but in this I cannot follow him, since I believe these sections are really genera, to which names have already been applied.

Four genera have been recognized, and are distinguishable by the aid of the following table :

Table of Genera.

Front wings with three cubital cells; pronotum often with a tubercle at base above.....2.

Front wings with two cubital cells; pronotum never with a tubercle at base above.

Metathorax subquadrate, a little longer than wide, squarely truncate posteriorly, but the superior hind angles not produced into strong teeth, at the most with a small tubercle or tooth, the dorsum with longitudinal carinae, the interstices transversely striate; claws with a median tooth beneath; maxillary palpi 6-, labial palpi 4-jointed; head *without* a frontal area above antennae; submedian cell not longer than the median; first flagellar joint longer than 2-3 united; pronotum fully twice as long as wide at

base.....Rhynopsis, Westw.

Metathorax quadrate, the superior hind angles more or less produced into blunt tubercles or short teeth, the dorsum sculptured as in *Rhynopsis*; claws cleft; head *with* a frontal area above the antennae, or at least with strong lateral carinae extending from base of each antenna backwards towards the ocelli; submedian cell a little longer than the median; first flagellar joint not longer than 2-3 united; pronotum not or only a little longer than wide at base.....Waagenia, Kriechbaumer.

2. Superior hind angles of metathorax produced into strong teeth or long spines; claws cleft.

Face normal, *without* an enclosed frontal area above the antennae; pronotum always tuberculate; abdomen in ♀ compressed at apex; metathoracic spines very long.....Chlorampulex, Sauss.

Face with a frontal area above the antennae, which encloses the front ocellus; pronotum more rarely tuberculate; abdomen in ♀ not compressed at apex; metathoracic spines not

long.....Ampulex, Jurine.

North American Species.

FAMILY XXVI.—*Ampulicidae*.

Subfamily I.—*Dolichurinae*.

(1) *DOLICHURUS*, Latreille.

(2) *TRIROGMA*, Westwood.

(3) *APHELOTOMA*, Westwood.

Subfamily II.—*Ampulicinae*.

RHYNOPSIS, Westwood.

(1) *R. canaliculata*, Say., ♀ ♂.
= *Abbottii*, Westw.

(2) *R. maculicornis*, Cam., ♀.
WAAGENIA, Kriechbaumer.

CHLORAMPULEX, Saussure.

AMPULEX, Jurine.

(1) *A. angusticollis*, Spin., ♀.

A CONTRIBUTION TO THE DISCUSSION OF SPILOSOMA
CONGRUA.

BY R. OTTOLENGUI, NEW YORK.

I have found the discussion of the identity of *Spilosoma congrua*, originating with the article by Rev. Dr. Fyles, most interesting, and am tempted to record certain facts not in consonance with the published views of the gentlemen who have already written.

Dr. Fyles appears to argue that *cunea* may be *congrua*. He tells us, speaking of *textor*, that there is one brood in his locality usually spotless and measuring 14 lines, and then states that "southward there is a second brood of *textor* noted for its variations, this being supposed to be the *cunea* of Drury." He then refers to Prof. Riley's figures of *cunea* (Forest Insects, page 245), and declares that with his series of bred specimens of *congrua* he can match all of Prof. Riley's figures in maculation, and especially in size.

In Prof. Smith's reply to Dr. Fyles I find this statement: "Nearly all the northern specimens (*cunea*) run small; the southern specimens, on the other hand, mostly run large."

Early in the spring of this year it will be recalled that a "cold snap" overspread the entire Atlantic coast. This cold was especially exceptional in the Southern States, and the approaching summer was so delayed that vegetation budded but two weeks earlier in South Carolina than in New York City. I spent the latter half of March in Summerville, South Carolina, and when I left the young leaves were just giving the forest a delicate green tint. Two weeks later the parks in this city were in about the same condition. I mention this to indicate the closeness of the seasons south and north this year to make my deductions more pointed. One of the first moths to appear in the vicinity of New York is what we call *cunea*, and they can be commonly expected early in April. This early brood is almost invariably spotless, or practically so. During my stay in Summerville, the nights being very cool, and even the days far from warm, insect life was not very abundantly noticeable. The only moth really common was *cunea*, of which I took about twenty specimens and saw above a hundred others. While I did not capture all that I saw, I particularly examined them, this being easy, as they were sitting at rest along the piazzas and hallways. This examination was made because I noted that these early moths were all profusely spotted, all without exception

being like fig. j of Prof. Riley's series. This astonished me because of my northern experience, and I scrutinized all that I saw, even though I did not bottle them, being on the watch for an immaculate specimen. All pure white moths found, however, proved to be *virginica*, and of these I took but three. Thus it seems improbable that Dr. Fyles's idea is correct, and that a *second* brood in the south is spotted. These insects captured by me in the middle of March, in a backward season, can hardly have come from larvæ hatched the same year. In regard to size, Prof. Smith's idea does not hold, for the largest specimen taken is slightly smaller than my smallest northern specimen.

Next, a word as to the distribution of *congrua*. Prof. Smith contends that *congrua* is not recorded (except Walker's Georgia specimens) from the south. It happens that the set in my collection is peculiar in the light of this statement. I have one male, given to me years ago by Miss Emily Morton, still bearing her label, New Windsor. Then, one male and two females from Nashville, Tennessee, and lastly, two males taken by myself in March at Summerville, So. Ca., so that of my six specimens, five are southern.

A few more words as to size and maculation, and I have done. The study of variable insects is naturally more interesting than where we have to consider species fairly constant in pattern; but there is a point which I desire to make which I have not seen noted by any other authors, though not improbably it has been. I believe that *there is a type of pattern in all species*, and that this type will be constant, regardless of the variability. Thus, in a spotted species certain spots will be constant whether accompanied by others or not. If we have to deal with a species sometimes spotted and sometimes immaculate, then the immaculate form must be the type, and the spotted forms merely variations, though among these spotted variations there may be found a constancy as true as with a normally spotted species. Can we apply this rule to *congrua* and *cunea*? Let us call *congrua* a spotted species and *cunea* an immaculate species, and weigh the result. Dr. Fyles records a long series of *congrua* and describes the variations of the pattern, but he has noted that on his most immaculate form there was a small black dot on the median nerve at the angle of the second fork. This dot he records on all his varieties, and it is therefore the constant character which prevents us from considering that the typical pattern is immaculate. Nevertheless, later he tells us that with his

series he has been able to match all of Prof. Riley's figures of *cunea*, overlooking the fact that the dot at the fork is not a constant feature of Prof. Riley's series, if, indeed, it occurs at all exactly as it does in *congrua*. Examining my own six specimens of *congrua*, which vary considerably otherwise, the dot at the fork is present in all. My New Windsor specimen is immaculate except for the dot. The three from Tennessee all have the dot, but also a faint row of spots near the outer margin. My Summerville specimens are worthy of special mention. I was inclined to think they might represent a new species, until Dr. Dyar expressed a contrary view. It is still possible that they are distinct; I have not yet had time to give full study to the subject. On Dr. Dyar's opinion, however, they may rest for the present as *congrua*. They have the spot at the fork and a row of spots near the border, in this respect matching the Tennessee specimens very well. But the outer half of the costa is black, the tips are blackish, and the upper half of the fringes are also blackish. At a casual glance one would say they had been soiled in an electric-light globe, but there being two specimens similarly marked and having been taken where the only electric lights were enclosed in incandescent globes, the dark parts must be considered as normal. Moreover, Dr. Dyar tells me he has seen one specimen in which all of the primary was smoky.

In regard to *cunea* there is certainly a purely immaculate form, nine such specimens being before me. Dealing with the spotted forms, can we find the typical pattern which is constant? I think so; and it is not a spot at the fork; it is, I think, a spot on the costa, near the base. I have a specimen showing this spot, which is otherwise immaculate, and my series includes seventeen specimens, in every one of which this spot on the costa occurs, in the more maculated forms being the top of a veritable band. The extreme of my series is so suffused that the bands nearly coalesce, giving the primaries an almost uniform colour. Curiously enough, this is one of my Summerville specimens, and is as small as any that I have.

In regard to size, it seems very certain that *congrua* is a much larger species, even though the smallest *congrua* may match the largest *cunea*. My *cunea* range from 30 mm. (♂) to 35 mm. (♀), while my *congrua* range from 35 mm. (♂) to 45 mm. (♀).

There is no doubt in my mind that *congrua* is distinct from the *cunea* forms, but is it possible that the immaculate and the spotted forms of *cunea* may be distinct?

NEW SPECIES OF NORTH AMERICAN MYRMELEONIDÆ.

BY ROLLA P. CURRIE, WASHINGTON, D. C.

V.

In the CANADIAN ENTOMOLOGIST for March, 1899, page 70, Mr. Nathan Banks describes a new species of *Brachynemurus* under the name *tuberculatus*. The specimen used in drawing up the description was a female, and as I find a male of this species in the National Museum collection, a description of it is given here :

Brachynemurus tuberculatus, Banks.

Male.—Length, 21.5 mm.; expanse of wings, 33 mm.; greatest width of anterior wing, 3.6 mm.; length of antennæ, 4 mm. Much smaller and more slender than the female.

Antennæ longer and less clavate. The form of head and thorax is similar to that of the female and the markings are similar.

Abdomen pale luteous, clothed with white and black hairs; an interrupted longitudinal fuscous line on the dorsum, and a broader, less clearly defined stripe each side; segments of apical third of abdomen almost entirely fuscous.

Appendages similar in form and proportionately as long as those of *B. Sackeni*; black, clothed with long black and white hairs; each appendage armed, interiorly, with about a dozen strong, blunt, black spines.

Wings smaller, more slender, and less heavily marked than in the female.

Type.—No. 4328, U. S. National Museum. Collected in Madera Canyon, Santa Rita Mts., Arizona, June 8, 1898, by Mr. E. A. Schwarz.

Two more specimens of this species, females, were collected at the same locality by Mr. Schwarz on June 8 and 14, respectively.

Brachynemurus papago, new species.

Male.—Length, 40 mm.; expanse of wings, 57.5 mm.; greatest width of anterior wing, 7.5 mm.; length of antenna, 7 mm. Slender; above luteous, marked with fuscous; below, principally fuscous; clothed with black and white hairs, especially on the abdomen.

Face nearly flat, luteous; upper part, between and surrounding the antennæ, piceous, sending a median line and one on each side down to the clypeus. Circumocular area luteous, a few fuscous spots posteriorly. Clypeus luteous, clouded with fuscous. Labrum transverse, luteous;

rounded laterally and anteriorly narrowed, emarginate in front. Mandibles piceous.

Maxillary palpi moderate, piceous, luteous at articulations ; first two joints short, about as broad as long, subequal ; third joint a little longer than first two together, somewhat curved ; fourth slightly shorter than third ; apical joint as long as third, subcylindrical (very slightly swollen medially), darker piceous ; tip truncate, pale.

Labial palpi a little longer than maxillary ; first joint twice as long as broad, piceous ; second joint about three times as long as first, curved, swollen apically, luteous, piceous at base ; apical joint fusiform, piceous, moderately hirsute ; tip fine, truncate, pale.

Maxillary palpi luteous, with fuscous spots. Labium and mentum luteous, the former with a longitudinal median dark line.

Antennæ somewhat clavate, scarcely as long as thorax, fuscous, with very short, stiff hairs ; club paler ; articulations luteous ; first two joints luteous, clouded with piceous, the base of first joint surrounded by a luteous ring.

Vertex elevated behind, rounded, luteous ; depressed portion anteriorly dark fuscous ; elevated portion with two transverse, dark fuscous bands, the posterior more irregular and broken ; a mesial fuscous spot on posterior margin.

Pronotum with three longitudinal dark fuscous lines each side ; the median pair coalesce midway between front and hind margins, diverging posteriorly and anteriorly ; the outermost line on each side extends forward not quite to the transverse furrow. Beneath luteous, a longitudinal fuscous streak on each side near carina.

Meso- and metanotum with the lobes moderately elevated ; markings similar to those of *B. Hubbardii*. Sides and sterna fuscous, with luteous markings.

Abdomen above luteous for the basal two-thirds, a longitudinal dark fuscous line in the middle. Sides and venter fuscous. Apical segments dark fuscous, a few small, indistinct, luteous spots above. Apical segments thickly hirsute.

Appendages similar to those of *B. peregrinus* or *B. Coquilletti*, but still shorter, blunter, and more divaricate ; beset with the usual long coarse hairs or bristles ; dark fuscous, pale on inner sides ; the inferior triangular projection luteous.

Legs moderate, luteous, dotted and blotched with fuscous, beset with white and black hairs and spines; tibiæ piceous at bases and apices. Tibial spurs as long as first tarsal joint, slightly curved, rufo-piceous. Tarsal joints piceous apically, the third and fourth entirely so; claws slightly more than half the length of last tarsal joint, rufo-piceous.

Wings like those of *B. niger* and *B. brunneus*, though broader, and with markings darker than in the male of the latter species--almost equalling in size and in extent and intensity of the markings those of the females.

Female.—Length, 29 mm.; expanse of wings, 56 mm.; greatest width of anterior wing, 7.5 mm.; length of antenna, 5 mm.

Antennæ more clavate than in male. Abdomen a little shorter than wings, marked as in the male, but the luteous on dorsum extends further posteriorly. Tip of abdomen with long black hairs, principally dark fuscous; inferior part with coarse, blunt, black spines; below, two small cylindrical appendages, fuscous, with long black hairs. Markings of wings rather more pronounced than in the male.

Type.—No. 4369, U. S. National Museum. One male specimens, collected in Madera Canyon, Santa Rita Mts., Arizona, June 7, 1898, by Mr. E. A. Schwarz.

No. 4369a, U. S. National Museum. One female, with same locality and date, collected by Mr. Schwarz.

Named after the Indian tribe living in this section of country.

This species has the wings of *B. niger* or *B. brunneus*, six prothoracic lines as in *B. Sackeni*, and meso- and meta-notal markings similar to those of *B. Hubbardii*. The abdomen and appendages resemble those of *B. peregrinus*.

Brachynemurus pusillus, new species.

Female.—Length, 19 mm.; expanse of wings, 36.4 mm.; greatest width of anterior wing, 4.7 mm.; length of antenna, 4 mm. Slender; head and thorax luteous, marked with fuscous; abdomen principally fuscous.

Face flat, luteous, the portion behind and in front of antennæ piceous, a more or less distinct luteous spot between the antennæ; a dark line extends from the piceous area in front down towards the clypeus. Circumocular area luteous, with some fuscous spots behind. Clypeus

luteous. Labrum luteous, obscurely clouded with fuscous. Mandibles piceous.

Maxillary palpi moderate, luteous; first two joints short, subequal; third about the length of 1 plus 2; fourth somewhat shorter than third; apical joint as long as third, tip narrowed, truncate.

Labial palpi about same length as maxillary; first joint short, twice as long as broad; second joint three times longer, curved, apically enlarged; apical joint as long as second, fusiform, sparsely haired, tip fine, truncate.

Maxillary palpigers luteous, marked with fuscous. Labium and mentum luteous.

Antennæ strongly clavate, scarcely as long as thorax, moderately hirsute, luteous, a fuscous spot on nearly all the joints; club thickly spotted with fuscous above; two basal joints luteous, shining.

Vertex elevated, luteous; two transverse fuscous bands on elevated portion, the posterior band very irregular.

Pronotum longer than broad, strongly narrowed anteriorly, somewhat rounded in front; a broad longitudinal median fuscous band, interrupted at the transverse furrow, but continued beyond it; the band is more or less divided lengthwise by a faint luteous line; the portion behind the furrow is anteriorly exteriorly excised; an irregular, interrupted fuscous line and some small spots each side. Beneath luteous, a fuscous streak each side near carina.

Mesonotum with lobes moderately elevated, with a number of long curved black bristles and some smaller white hairs; anterior lobe fuscous, divided longitudinally by a fine luteous line, a round luteous spot each side; lateral lobes luteous, each with a C-shaped fuscous spot, opening externally, and other irregular spots; between the lateral lobes and going back across the posterior lobe is a fuscous band, extending laterally in front, forming a T-shaped marking. Sides and sterna luteous, spotted with fuscous.

Metathorax marked similarly to the mesothorax.

Abdomen fuscous; dorsum with the articulations and an irregular spot in the middle of each segment luteous. Tip of abdomen with the usual long hairs and short, coarse, black spines; below, two small yellow cylindrical appendages with long black hairs.

Legs moderate, luteous, dotted with piceous on femora; apices of femora and tibiae piceous; each tibia encircled with another transverse piceous band near base, less pronounced on posterior legs. Tibial spurs as long as first two tarsal joints on anterior and middle legs, shorter on posterior, moderately curved, rufo-piceous; tarsi with third and fourth joints and tip of the apical one piceous; claws slightly more than half the length of last tarsal joint, rufo-piceous.

Wings a little longer than abdomen, hyaline, the posterior margins slightly incurved apically. Outer half of pterostigma luteous, inner half fuscous. Apical third or more of intercostals forked in anterior wings, a less number in the posterior wings. Veins hairy, the costa mostly luteous, the subcosta fuscous, interrupted with luteous between transversals; other veins fuscous, less regularly interrupted with luteous.

Anterior wings with a series of fuscous spots between the subcosta and the vein immediately below it—these spots for the most part cover the transversals; a few rather large spots on anterior side of submedian vein and one at its tip; another spot at the tip of postcosta, near hind margin; smaller forks near apices of wings clouded with fuscous; posterior wings a little shorter and narrower than anterior, unspotted. Posterior borders of both wings fringed with fine hairs.

Male.—Length, 18 mm.; expanse of wings, 33.5 mm.; greatest width of anterior wing, 3.8 mm.; length of antenna, 4 mm. Somewhat smaller than the female; antennæ less clavate; appendages extremely short (not discernible in this specimen except with a lens), blunt, luteous, clouded with fuscous; inferior triangular projection luteous, with long dark hairs.

Type.—No. 4370, U. S. National Museum. One female from the college campus, Mesilla Park, New Mexico, June 13th, collected by Prof. T. D. A. Cockerell.

No. 4370a, U. S. National Museum. One male collected in Madera Canyon, Santa Rita Mts., Arizona, June 14th, 1898, by Mr. E. A. Schwarz.

Co-type.—One female collected at Fort Grant, Arizona, July 12th, 1897, by Mr. H. G. Hubbard.

This species is remarkable on account of its small size and the prominent spots on the anterior wings. The abdomen is marked very much as in *B. Sackeni*. The short abdomen and inconspicuous appendages of the male are also peculiar.

OBSERVATIONS UPON BOMBYX CUNEA, DRURY, ETC.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

Messrs. Dyar, Smith, and Grote have given us much interesting information concerning *Bombyx cunea*, Drury, and insects associated with it. I have hoped that further particulars would be forthcoming, for the position these insects have held in our Entomological lists has not been satisfactorily established.

It is very evident that much perplexity in regard to *cunea*, and the rest, has existed from Walker's day down to the present time.

Let us recall some of the facts connected with them that have come under our notice.

In 1770, Drury figured a moth which he named *Bombyx cunea*—probably from a fancied resemblance in the coloration of the insect to that of the spotted carriage-dog of Europe. He did not show the hind tibiæ of the insect.

Eighty-five years afterwards, Walker described certain insects that he found in the British Museum collections. Six of them from Georgia and two from New York he classified as *Spilosoma cunea*, believing them to belong to the species figured by Drury. Three of them from Georgia he described as a new species, under the name of *Spilosoma congrua*. He did not describe the hind tibiæ of either kind.

It was Harris who originated the generic term, *Hyphantria*. In his "Insects Injurious to Vegetation," edited by Flint (1862), p. 358, we read :

"This species was first described by me in the seventh volume of the *New England Farmer*, page 33, where I gave it the name of *Arctia textor*—the weaver—from the well-known habits of its caterpillar. Should it be found expedient to remove it from the genus *Arctia*, I propose to place the genus which shall include it, *Hyphantria*—a Greek name for weaver—and place in the same genus the many-spotted ermine-moth, *Arctia punctatissima*, of Sir J. E. Smith, which is found in the Southern States, and agrees with our weaver in habits."

Harris says nothing about the posterior tibiæ of either *textor* or *punctatissima*. The weaving habits of the larvæ suggested the names he gave : *Hyphantria* (Gr.), a female weaver ; *textor* (L.), a male weaver. He believed that *punctatissima* and *textor* were distinct, specifically, one from the other.

It has since been discovered that there are slight structural differences of the hind tibiae between insects of the genus *Hyphantria* and insects of the genus *Spilosoma*. (Smith, CAN. ENT., Vol. XXII., pp. 161, 163; Dyar, CAN. ENT., Vol. XXXI., p. 156.)

Drury's types have long been lost: Walker's have been destroyed, or are in hopeless confusion. We may, then, pertinently ask this question,—

Is it anything more than an assumption that Drury's moth would properly come in the genus Hyphantria?

Several writers have supposed *punctatissima* and *cunea* to be identical; but in reality we have nothing to guide us respecting *cunea* except Drury's figure, and Walker's description, which reads as follows:

"White; abdomen yellowish, white on the hind borders of the segments and towards the tip, and with one dorsal, one ventral, and two lateral stripes of black spots.

"Fore wings with four irregular oblique macular, more or less imperfect, brown bands.

"*Female*.—Hind wings with some brown submarginal spots. Length of the body, 5–6½ lines; of the wings, 13–18 lines." *Cat. Lep. Het. B. M.*, III., p. 669n. 7 (1855).

Unfortunately, we cannot attach as much importance to this description as we could wish, because of Prof. Grote's testimony as to the perplexity under which Walker laboured. (See CAN. ENT., Vol. XXXI., p. 268.) We are, therefore, thrown back mainly upon Drury's figure; and we find it sufficient.

In 1890, the Department of Agriculture, Washington, issued a report on the insects affecting forests trees, by Dr. A. S. Packard. In it is an account of the Fall web-worm, copied from Professor Riley's "Our Shade Trees and their Insect Defoliators."

On page 246, Riley is thus quoted:

"The moths vary greatly, both in size and coloration. They have in consequence of such variation received many names, such as: *cunea*, Drury; *textor*, Harr.; *punctata*, Fitch; *punctatissima*, Smith (Fig. 87). But there is no doubt, as proven from frequent breeding of specimens, that all of these names apply to the very same insect, or at most to slight varieties, and that Drury's name, *cunea*, having priority, must be used for the species."

Riley illustrated his position by cuts, under which we find:

" Fig. 87.—*Hyphantria cunea*: a-j, wings of a series of moths, showing the variations from the pure white form to one profusely dotted with black and brown."

Doubtless, Riley believed that he was portraying *cunea*, *textor*, *punctata*, and *punctatissima*, but strange to say,—

Not one of his cuts answers to Drury's figure!

I need not enlarge upon this. Let anyone who is interested in the matter take Riley's figure 87, and place it beside Drury's—either in the original or in Westwood's reprint—and the discrepancies will at once strike the eye.

In my former paper I spoke of a much-spotted *Spilosoma* taken in company with *S. congrua* at the Gomin Swamp. I have long known insects of this kind. The late Mr. F. B. Caulfield showed me one, twenty years ago; and I have met with other specimens since. No one acquainted with this moth would believe that it came from a Fall web-worm. Five specimens of it were taken in this locality in 1897. I have a pair of them in my collection, and I have just compared the male with Drury's figure in Westwood's reprint, and it agrees with it exactly—so exactly that one might imagine it to be the very specimen from which the engraver worked. I give a description of these insects:

Expanse of wings, $16\frac{1}{2}$ lines; breadth of fore wing, 4 lines; breadth of hind wing, $4\frac{1}{2}$ lines; length of body, 8 lines.

Thorax broad, white above and fluffy; abdomen yellow with white borders to the segments and a white tip, and with five longitudinal rows of black dots. Antennæ pectinated, white above and dark brown beneath; eyes brown; palpi dark brown; fore part of thorax under the head brown; front legs—femora luteous, spotted with black on the inner side; tibiae and tarsi white on the outer side, dark brown on the inner; the tibiae of the middle and hindmost pairs of legs spurred. Fore wings white with a faint testaceous tinge, and with four irregular broken rows of brown spots. The spots near the apex are somewhat elongated and wedge-shaped. From the apex to the middle of the hind margin, close to the fringe, is a row of brown dots. On the under side of the fore wings there are some dark brown apical dashes, and a brown lunette towards the middle of the wing, but nearer the costa than the hind margin. The hind wings have a brown lunette near the middle of the upper part, and

a subterminal row of spots and dashes—these are more conspicuous on the under side than on the upper.

In the female the dimensions and spots are much the same as in the male. The antennæ are of course without pectinations; the fore part of the thorax underneath is luteous; the black spots on the luteous femora are very conspicuous.

Here, then, apparently, we have Drury's insect.

I was inclined at first to think it an extreme form of *congrua*. It was taken at the same time and in the same locality as that insect, and in contour and size the two are very similar; but I find, on the other hand, that of all my twenty-eight bred specimens of *congrua*, not one has anything like the spotted underwing that is so remarkable in Drury's figure. Six of them have a faint dot in the upper part of the secondaries, just such as is given in cuts *i* and *j* in Riley's "Fig. 87," and that is all.

The question of locality does not come in here. We know not how wide or how restricted a field this true *Spilosoma cunea*, Drury, may have. The species is rare, but it exists!

With regard to *Spilosoma congrua*, we have these particulars:

- (a) Walker described it.
- (b) Prof. Grote found it in Walker's keeping; spoke to him about it; made a further description of it.
- (c) Dr. Hulst and others have bred it.
- (d) *S. Antigone* has been found to be identical with it.

The whole matter seems to be very clear; and our lists should read:

SPILSOMA, Steph.

cunea, Drury.

congrua, Walker.

Antigone, Strk.

HYPHANTRIA, Harris.

Punctatissima, S. & A.

textor, Harris.

A COCCID FROM THE FAR NORTH.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Eriococcus borealis, n. sp., ♀.—Sacs on twigs, closely felted, rather rough, broad oval, grayish-white, about $2\frac{1}{2}$ mm. long. Female oval. Mounted specimens full of embryos are nearly 3 mm. long. Gives no red colour on boiling in caustic potash. Skin after boiling, greenish or

grayish, thickly beset with round to oval hyaline spots. Dermal spines only moderately numerous, 27-45 μ long, the shorter ones more numerous than the longer. Caudal lobes long, brownish, irregularly cylindrical, about 42 μ broad and 90 μ long. Buccal apparatus about 120 μ broad; rostral loop rather short; mentum rather long. Antennae and legs pale brown; antennae varying from 7- to 8-jointed, the joints after the first measuring as follows in μ :—8-jointed form: (2.) 30, (3.) 45, (4.) 27, (5.) 24, (6.) 24, (7.) 27, (8.) 36. Formula 382 (47) (56). 7-jointed form: (2.) 42, (3.) 54, (4.) 51, (5.) 24, (6.) 24, (7.) 29. Formula 3427 (56). Hind legs: coxa 120, femur with trochanter about 180, tibia 111, tarsus 126, claw 26 μ . Anterior legs: tibia 90, tarsus 111 μ . Tarsus always longer than tibia. Young dark crimson, with a fringe of glassy rods.

Hab.—On willow (*Salix*), Dawson City, 64° N. Lat., collected by Mr. John Morley; sent to me by Mr. Alex. Craw. *E. borealis* is peculiar for the dermal markings, and the antennae varying from 7 to 8 joints.

LEPISIESIA ULALUME, STRECKER, IN BRITISH COLUMBIA.

BY ARTHUR GIBSON, CENTRAL EXPERIMENTAL FARM, OTTAWA.

In a box of Lepidoptera sent to the Division of Entomology, for identification, by Mr. W. A. Dashwood-Jones, of New Westminster, B. C., was a specimen of the above named sphingid. The specimen was kindly named by Dr. J. B. Smith, who wrote of it, saying: "It is a genuine rarity, and in 1888 there was not a specimen known save the type. If I remember rightly, this is the first specimen other than the type that I have ever seen." Mr. Dashwood-Jones states that this season he took seven specimens of *ulalume*; and, further, that he takes them every year in his garden, on white lilac blossoms. He mentions that he has never seen this moth anywhere else, but that for a few days in spring they appear to be fairly plentiful. Dr. Fletcher tells me that three years ago, when examining some insects in the Department of Agriculture of British Columbia, he saw two specimens, taken by Mr. W. A. Lawes at Enderby, B. C., which he now thinks were *ulalume*, but which at the time he thought were large specimens of *flavofasciata*. Mr. Dashwood-Jones has kindly presented to the Division a second specimen, which has a flush of yellow on the disk of the secondaries.

OBITUARY.

On the 16th of October there passed away, at Peterborough, one of the original members of the Entomological Society of Ontario. The REV. VINCENT CLEMENTI, B. A., died at the age of eighty-seven years. He was a clergyman of the Church of England, but had retired from active service some years ago, in consequence of failing eyesight and other infirmities. Born in England, the son of a famous musical composer, U. Clementi, Esq., and educated at the University of Cambridge, he came to Canada in 1855 and settled in Peterborough. In 1863 he was appointed rector of Lakefield, where he remained for eleven years; he then became rector of Lindsay, and on his retirement returned to Peterborough to spend the rest of his days. He was an active member of the Masonic Society, and rose to be Chaplain of the Grand Lodge of Ontario. In his younger days, and indeed throughout the whole of his life, he was devoted to natural history, horticulture, and art, and was especially interested in entomology. He contributed occasionally to the early volumes of this magazine, and took a hearty interest in the welfare and success of the Society. His water-colour drawings of insects were remarkable for their accuracy and beauty of execution. He was held in the highest respect and regard by all who knew him, and died in a good old age, a devout and upright man. To his sorrowing widow, the aged partner of his life, we beg to tender our deep and respectful sympathy.

BOOK NOTICES.

GENERAL INDEX TO MISS ORMEROD'S REPORTS ON INJURIOUS INSECTS, 1877 TO 1898.—By Robert Newstead, F. E. S. London: Simpkin, Marshall & Co. (Price, 18 pence.)

For twenty-two years Miss Ormerod has been issuing her valuable Reports of Observations on Injurious Insects, and in them has furnished a most useful mine of information regarding all the principal insects that have been productive of injury in the British Isles during this long series of years. To render this mine readily available at any moment, a very satisfactory index has been prepared by Mr. Newstead. The greater part of it consists of a "General Index," in which reference is given to every insect treated of in the Reports under its scientific name, with references also to habits, modes and subjects of attack, etc. This is fol-

lowed by a "Plant Index," with references to the insects attacking each; a similar "Animal Index," and a third comprising other matters attacked, such as bones and leather, seeds, etc.

We are glad to learn from her preface to the volume that Miss Ormerod is about to begin a Second Series of Reports in a somewhat different form. We earnestly hope that she may long be spared to continue her noble work.

INDEX OF SPECIES TO KIRBY'S SYNONYMIC CATALOGUE OF LEPIDOPTERA
HETEROCERA.—Vol. I., Sphinges and Bombyces. By Herman Strecker,
Ph. D., Reading, Pa. (Price, 50 cents.)

This pamphlet, of forty-five pages, represents an enormous amount of tiresome and painstaking work, and will surely be welcomed by everyone who has occasion to consult Kirby's great catalogue of the two families mentioned above. Without this index, the nine hundred pages and over are, as Dr. Strecker states, a sealed book to almost everyone; an index to genera alone is comparatively useless in consequence of the changes in nomenclature that are constantly taking place; it is by the specific name that an insect is really known. The index contains fully 8,000 names, and gives the page or pages in the catalogue where each one occurs. For instance, to take one or two names at random, *Affinis* has twenty references, *Basalis* thirty-two; but the great majority only one. The thanks of all students of the Lepidoptera are certainly due to Dr. Strecker, and they can best manifest their gratitude by sending to him for a copy, in order to save him from pecuniary loss.

THE NORTHWEST (CANADA) ENTOMOLOGICAL SOCIETY.

The first annual meeting of this Society was held at Lacombe, Alberta, on Tuesday, November 7th, and was well attended by members, agriculturists, and others. A full account of the proceedings will be published in the Annual Report of the Entomological Society of Ontario. The following were elected officers for the ensuing year:

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INDEX TO VOLUME XXXI.

- Acknowledgments, 52, 232.
 Acontia aprica, var. biplaga, 17.
 Acridiidae, notes on some Ontario, 29.
 African, West, Moths, 88.
Aleurodes graminicola, n. sp., 89.
 " *mori*, n. sp., 1.
 " *Rolfii*, n. sp., 90.
 Aleurodidae, new or little known, 1, 89.
Alliognathus, n. gen., 219.
 Alysoninae, table of genera, 325.
Ameria texana, 9.
 Ammophilinae, table of genera, 351.
 Ampulicidae, list of North American species, 357.
 Ampulicidae, table of subfamilies, 355.
 Ampulicinae, table of genera, 357.
 Anacraebro, definition of genus, 165.
 Anosia archippus, 337.
Antonina Nortoni, n. sp., 280.
 Ant, relation of a species to the peach root louse, 15.
 Ants, Psychical powers of: Wasmann, 269.
Aphanognus salicicola, n. sp., 78.
 Aphis prunicola, 15.
 Aphorista keta, 85.
 Apple fruit, serious attack on, 12, 127.
 Argas columbae, 230.
 " persicae, 229.
Argogorytes, n. gen., 324.
 Argyrethia conjugella, 12, 127.
 Arkansas Truxalinae, 53.
 Ashmead, W. H., articles by, 145, 161, 212, 238, 291, 322, 345.
 Aspidiotus ancylus, 209, 226.
 " camelliae, 209.
 " convexus, a correction, 208.
 " cueroensis, n. sp., 105.
 " cydonia, 210.
 " dictyospermi, 45, 227.
 " duplex, var. *paoniae*, n. var., 105.
 Aspidiotus Fernaldi, sub-sp. *Cockerelli*, n. sub-sp., 10.
Aspidiotus helianthi n. sp., 176.
 " juglans-regiae, 209.
 " *Mariatti*, n. sp., 282.
 " perniciosus, odour of, 4.
 " rapax, 209.
Aspidoptera, n. gen., 334.
 " *Busckii*, n. sp., 335.
 Astatinae, table of genera, 327.
Asteroscopus borealis, n. sp., 25.
 Atethmia rectifascia, 135.
 Ball, E. D., articles by, 188, 306.
 Banks, N., article by, 67.
Baryconus bicolor, n. sp., 79.
 " *cinctus*, n. sp., 79.
 Bees and flowers, 256.
 Bees, classification of, 338.
 Behr, H. H., article by, 229.
 Bembicidae, table of genera, 239.
 Bembidula capnoptera, 255.
 " *Mesillensis*, 255.
 Bethune, C. J. S., articles by, 20, 48, 302, 371, 372.
 Beutenmuller, W., article by, 56.
 Bird, H., article by, 134.
Bombyx cunea, 97, 155, 174, 366.
 Book notices, 20, 48, 124, 157, 269, 302, 371.
Boopeton auriventris, n. sp., 54.
 Boros unicolor, 58.
 Brachyacantha 4-punctata, 81.
Brachynemurus papago, n. sp., 361.
 " *pusillus*, n. sp., 363.
Brachynemurus tuberculatus, n. sp., 70, 361.
 Brazilian Coccidae, 43, 131.
 British Columbia Longicorn Coleoptera, 107.
 Bryophila teratophora, 18.
 Butler, A. G., articles by, 19, 122.
 Butterflies, Catalogue of N. American: Skinner, 124, 195.
 Butterflies from Manitoba, 96.
 " " New Mexico, 65.
 Butterfly Book: Holland, 20.
 " wing structure, 337.
 Cabinet pest deterrent, 123.
Calinemurus, n. gen., 70.
 Carew-Gibson, E. A., article by, 127.
Catopsila sennae, 66.
Ceraphron crassicornis, n. sp., 77.
 Cercerinae, list of N. American species, 295.
 Cercerinae, table of genera, 292.
 Ceruchus piceus, 24.

- Cerachus punctatus*, 24.
 " *striatus*, 24.
Ceuthophilus polluticornis, n. sp., 118.
 " *salebrosus*, n. sp., 120.
 " species of, 118.
Chloealthis abdominalis, 35.
 " *conspersa*, 53.
Chlorippe celtis at Montreal, 287.
 " *montis*, 65.
Chrysophanus thoe of Gray. Why is it not *C. hyllus*, Cramer? 122.
Cirrophanus Dyari, n. sp., 288.
Clementi, Rev. V., death of, 371.
 Clover-root mealy bug, 279.
Coccidae, new species of, 5, 43, 46, 103, 105, 131, 176, 267, 280, 369.
Coccidae, odour of, 4, 36, 87, 96.
Coccidae of Massachusetts, contributions to knowledge of, 109, 139, 225, 251.
Coccidae, tables for the determination of the genera, 273, 330.
Coccinellidae of Ontario and Quebec, 81.
Cochlidionidae, synonym of, 71.
Cockerell, T. D. A., articles by, 5, 36, 43, 65, 105, 255, 267, 273, 288, 330, 369.
Coleoptera from Halifax, N. S., 320.
 " in September, 310.
 " of Canada, 21, 57, 81, 107.
 " of Kansas, 37.
Coquillett, D. W., articles by, 8, 333.
Corrigenda, 188, 343.
Cossonus Hamiltoni, n. sp., 193.
Crabronidae, table of subfamilies, 163.
Crabroninae, table of genera, 166.
Cross, E. W., death of, 160.
Ctenucha Cressonana, 159, 192.
Currie, R. P., article by, 361.
Cyphoderris monstrosa, 117.

Dactylopius eriogoni, n. sp., 103.
 " *formicarii*, n. sp., 6.
 " *hymenocleae*, n. sp., 267.
 " *Kingii*, 45.
 " *Quaintancii*, 6.
 " *sorghiellus*, 45, 111.
 " *trifolii*, 279.
Danaus archippus, 337.
Deltocephalus areolatus, n. sp., 188.
 " *callidus*, n. sp., 306.
 " *castoreus*, n. sp., 308.
 " *flexulosus*, n. sp., 189.
 " *missellus*, n. sp., 191.
 " *ordinatus*, n. sp., 307.
 " *paludosus*, n. sp., 307.
 " *satur*, n. sp., 309.
 " *stylatus*, n. sp., 190.
 " *vinculatus*, n. sp., 191.

Dermestes lardarius in honeycomb, 304.
Diabrotica vittata, winter breeding in forcing houses, 136.
Diaspis amygdali, fatal temperature for, 130.
Diaspis auranticolor, n. sp., 106.
 " *celtidis*, n. sp., 106.
Dichromorpha viridis, 53.
Didasia cinerea, n. sp., 285.
 " *nerca*, n. sp., 285.
 " table of Californian species, 284.
Diphylism of Diurnal Lepidoptera, 290.
Dolichurinae, table of genera, 356.
Dorcus brevis, 23.
 " *parallelus*, 23.
Dunning, S. N., article by, 344.
Dyar, H. G., articles by, 27, 61, 88, 127, 155, 158, 266, 286, 289.

Edwallia rugosa, n. sp., 131.
Ehrhorn, E. M., articles by, 5, 103.
Encoptolophus sordidus, 36.
Endomychidae, Canadian, 85.
Entomological books free of duty, 96.
 " Society of Albany, 195.
Entomological Society of Northwest (Canada), 80, 372.
Entomological Society of Ontario, 129, 305.
Epicrossocerus, n. gen., 215.
Epiphilanthus, n. gen., 294.
Epitrix parvula, 194.
Epizeuxis gopheri, n. sp., 94.
Eriococcus adenostomae, 47.
 " *araucariae*, 47.
 " *borealis*, n. sp., 369.
 " *Gillettei*, n. sp., 46.

Errata, 188, 343.
Erritettix virgatus, 53.
Eucalyptera bipunctata, 134.
Euchloe, notes on the American forms, 19, 56.
Euchloe Reakirtii, 19, 56, 66.
Evans, J. D., article by, 320.

Feltia robustior, n. sp., 201, 206.
Fenyes, A., article by, 232.
Fernald, C. H., article by, 157.
Flashlights on Nature: Grant Allen, 303.
Fletcher, J., articles by, 8, 14.
Fowler, C., articles by, 137, 283.
French, G. H., article by, 9.
Fyles, T. W., articles by, 47, 366.

Galgula subpartita, 18.
Gammarotettix bilobatus, 121.
Gargaphia angulata, n. sp., 301.
Gibson, A., article by, 370.

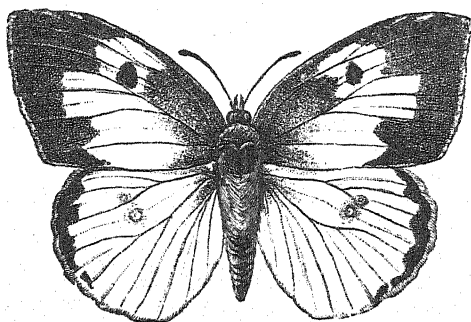
- Gillette, C. P., article by, 9.
 Gopher moth, description of, 94.
 Gorytes moneduloides, 345.
 Gorytinae, table of genera, 323.
 Grote, A. R., articles by, 71, 192, 268, 290.
Habropoda depressa, n. sp., 283.
 " *miserabilis*, 284.
 Habropoda, table of Californian species, 283.
Hadena allecto, n. sp., 260.
 " *Barnesii*, n. sp., 258.
 " *calatina*, n. sp., 261.
 " *dionea*, n. sp., 258.
 " *ethnica*, n. sp., 263.
 " *letabilis*, n. sp., 263.
 Hadena miseloides, description of larva, 286.
Hadena pausis, n. sp., 262.
 " *runata*, n. sp., 257.
 " *virguncula*, n. sp., 259.
 " *viridimusa*, n. sp., 264.
 Hanham, A. W., articles by, 49, 197, 312.
Hapalomellinus, n. gen., 299.
Harpectostigma, n. gen., 299.
 Harrington, W. H., articles by, 77, 107.
 Harrington, W. H., portrait of, 21.
 Heath, E. F., articles by, 95, 194.
 Heidemann, O., article by, 301.
 Heliopsis armiger, 18.
Hemiudeopsylla californiana, 121.
 " *platyceps*, 121.
 Hempel, A., article by, 131.
 Hippoboscidae, new genera and species of, 335.
 Hippoboscidae, table of genera, 335.
 Howard, L. O., article by, 96.
 Hubbard, Henry G., death of, 72.
Hydræcia necopina, 18.
 Hymenoptera, notes on, 255.
Hyphantria punctatissima, 100, 366.
 " *textor*, 99, 366.
Hypocrabra, n. gen., 168, 172.
Hypomellinus, n. gen., 299.
Hypothyreus, n. gen., 171.
Hypsoropha hormos, life history of, 289.
Icerya Hempeli, n. sp., 43.
Ingura delineata, larva of, 27.
 Insectary, a serviceable, 73.
 Insects, their structure and life: Carpenter, 302.
 Japan, injurious insects introduced into, 128.
 Johnson, W. G., articles by, 87, 143.
 Kansas Coleoptera, collecting notes on, 37.
Kermes Austini, n. sp., 104.
 " *ceriferus*, n. sp., 5.
 " *Peltiti*, n. sp., 7.
 King, G. B., articles by, 109, 139, 225, 251.
 Knab, F., article by, 310.
 Knaus, W., article by, 37.
Lagosinia, n. gen., 332.
 Larrinae, table of genera, 241.
Lasius Americanus, 15.
Lecaniodiaspis rufescens, 104, 267.
Lecontia discicollis, 58.
Lemonias Druryi, 65.
 Lepidoptera, a Natural History of the British: Tutt, 157.
 Lepidoptera, Index to species of Kirby's Catalogue: Strecker, 372.
 Lepidoptera Phalaenæ in the British Museum, catalogue of: Hampson, 158.
 Lepidoptera, new species of: Strecker, 303.
Lepisesia ulalume in British Columbia, 370.
Leucobrepheps Middendorfi, 194.
 Lideniinae, table of genera, 165.
 Lochhead, W., article by, 304.
Lonatura salsura, n. sp., 310.
 Longicorns, a few Canadian, 107.
 Lucanidae of Ontario and Quebec, 21.
Lucanus dama, 21.
 " *masama*, 232.
 " *placidus*, 22.
Lycæna acmon, 66.
Lygocerus pallipes, n. sp., 77.
 Lyman, H. H., articles by, 124, 196.
 Lyrodinae, table of genera, 244.
Macroxyela ferruginea, larva of, 41, 127.
Mamestra anguina, 18.
 Manitoa butterflies, 95.
 " moths, list of, 49, 197, 312.
Margarodes hiemalis, 36.
 Marlatt, C. L., articles by, 208, 231.
 Matsumura, M., article by, 128.
 McNeill, J., article by, 53.
 Mediterranean Flour-moth, 143.
Meganola dentata, n. sp., 64.
 " *minor*, n. sp., 64.
Melanoplus atlantis, 30.
 " *collinus*, 33.
 " *Dawsoni*, 31.
 " *extremus*, 33.
 " *fasciatus*, 31.
 " *femoratus*, 34.
 " *femur-rubrum*, 32.
 " *islandicus*, 31.

- Melanoplus, minor, 33.
 " punctulatus, 34.
 Melitaea chara, 65.
 " leanira, race fulvia, 66.
 " Maria, n. sp., 12.
 Mellinidae, list of N. American species, 300.
 Mellinidae, table of genera, 299.
 Mellinogastra, n. gen., 300.
 Mellisodes grindelliae, 256.
 Mermiria rostrata, 53.
 Metacrabro, n. gen., 169, 172.
 Metanysson, n. gen., 326.
 Midea lanceolata, 19.
 Moffat, J. A., articles by, 17, 52, 144, 232, 337.
 Monacera, n. gen., 220.
 Mycetina testacea, 85.
 Myrmeleonidae, classification of, 67.
 Myrmeleonidae, new N. American species, 361.
 Myrmeleon ingenuus, 67.
 Mytilaspis argentata, n. sp., 44.
 " bambusicola, n. sp., 44.
 Needham, J. G., article by, 233.
 New Mexico butterflies, notes on, 65.
 Nidularia (?) Californica, n. sp., 103.
 Nitelinea, table of genera, 245.
 Nola clethra, n. sp., life history, 63.
 " phylla, larva of, 61.
 Nolidae, larvæ of N. American, 61.
 Norris, A. E., article by, 123.
 Northwest (Canada) Entomological Society, 80, 372.
 Nycteribidae, new genera and species of, 333.
 Nyssonidae, list of N. American species, 328.
 Nyssonidae, table of subfamilies, 322.
 Nyssoninae, table of genera, 325.
 Obituary notices, 72, 102, 160, 371.
 Odour of San Jose scale, 4, 36.
 Oncocnemis atrifasciata, 52.
 Ophiogomphus, description of genus, 233.
 Ophiogomphus, N. American species of, 234.
 Ormerod, Miss, Index to reports: Newstead, 371.
 Ornithodoros Americanus, 231.
 Ornithomyia confluenta, 335.
 " fulvifrons, 336.
 Orphula decora, 54.
 " pelidnus, 53.
 " speciosa, 53.
 Orphulella, N. American species of, 177.
 " affinis, n. sp., 183.
 Orphulella compta, n. sp., 180.
 " deserta, n. sp., 184.
 " obliquata, n. sp., 181.
 " picturata, n. sp., 182.
 " pratorum, n. sp., 186.
 " salina, n. sp., 185.
 " viridescens, n. sp., 187.
 Otiorhynchus ovatus, bite of, 14.
 Ottolengui, R., article by, 358.
 Oxybelidae, table of genera, 161.
 Pachypasa Nasmithii, 88.
 Pagara simplex, 9.
 Papilio Ajax, var. Marcellus, in British Columbia, 8.
 Parafairmairia, n. nom., 332.
 Parrott, P. J., articles by, 10, 176, 280.
 Passalus cornutus, 24.
 Pemphredoninae, table of genera, 221.
 Perdita grandiceps, 256.
 Personal notices, 136, 160, 196, 232, 304.
 Pettit, R. H., article by, 279.
 Phenacoleachia zealandica, 274.
 Philanthidae, table of subfamilies, 292.
 Philanthinae, list of N. American species, 296.
 Philanthinae, table of genera, 293.
 Philanthus, notes on, 344.
 Philometra Hanhami, n. sp., 207.
 Phrixocnemis validus, 121.
 Phymetocera fumipennis, larva of, 42.
 Pisoninae, table of genera, 247.
 Plagodis approximaria, n. sp., 266.
 " table of species, 266.
 Platycerus depressus, 23.
 " Oregonensis, 23.
 " quercus, 23.
 Pleuroneura aviigrata, 127.
 Podiinae, table of genera, 352.
 Podisma variegata, 29.
 Priognathus monilicornis, 59.
 Proctotrypidæ, new species from Ottawa, 77.
 Protothyraopus, n. gen., 170.
 Psammoleon, n. gen., 69.
 Pseninae, table of genera, 223.
 Pseudanthophilus, n. gen., 294.
 Pseudocrabro, n. gen., 169, 172.
 Pseudohelioryctes, n. gen., 248.
 " Foxii, n. sp., 248 (note).
 Pseudolfersia, n. gen., 336.
 " maculata, n. sp., 336.
 Pseudophilus, n. gen., 323.
 Psilopa petrolei, n. sp., 8.
 Psoroptes communis, 9.
 P., T. H., article by, 72.
 Pterellipsis, n. gen., 333.
 " aranea, n. sp., 334.

- Pteronus fulvicus*, larva of, 41.
Pterophoridae of N. America: Fernald, 48.
Pulvinaria innumerabilis, 142.
 " *pulchella*, n. sp., 132.
Pythidae of Ontario and Quebec, 57.
Pytho, table of species, 59.
 Quaintance, A. L., articles by, 1, 89.
 Reuter, Enzo, article by, 12.
Rhinosimus nitens, 60.
 " *viridiæneus*, 60.
Rhopalinae, table of genera, 218.
Ripersia arizonensis, n. sp., 5.
 " *villosa*, n. sp., 6.
 Robertson, C., article by, 338.
Roeselia sorghiella, larva of, 61.
Salpingus virescens, 60.
 San Jose scale, odour of, 4, 36.
Satyrus alope, race *nephele*, 66.
 Sawfly larvæ, descriptions of, 41.
Sceliphroninae, table of genera, 352.
Schinia trifascia, 18.
Schistocera Americana, 28, 29.
Scirtetica marmorata, 36.
 Scudder, S. H., articles by, 113, 177.
Scymnus, table of species, 82.
 Sheep scab mite, life history of, 9.
Sinodendron rugosum, 24.
 Skinner, H., articles by, 12, 195.
 Slosson, Mrs. A. T., article by, 193.
Smilia misella, 81.
 Smith, J. B., articles by, 25, 94, 174, 206, 257.
 Southerner arrested in Canada, 17.
 Southern noctuids at Rye, N. Y., 134.
Sphecodes perlustrans, 256.
Sphegidae, list of N. American species, 353.
Sphegidae, table of subfamilies, 348.
Spheginae, table of genera, 349.
Sphegoidea, classification of the superfamily, 145, 161, 212, 238, 291, 322, 345.
Spilosoma antigone, 98, 155, 174, 268, 369.
Spilosoma congrua, observations on, 97, 155, 174, 268, 358, 366.
Spilosoma cunea, 97, 155, 174, 268, 358, 366.
 St. Cyr, D. N., death of, 102.
Stenocrabro, n. gen., 216.
Stenopelmatinæ of the Pacific Coast, 113.
Stenopelmatus pictus, n. sp., 116.
 " table of species, 114.
 Stevenson, C., article by, 287.
Stilbometopa, n. gen., 336.
Stizidae, list of N. American species, 347.
 " table of genera, 345.
Synhalonia acerba, 138.
 " *albopilosa*, n. sp., 138.
 " *Californica*, n. sp., 137.
 Synonymy of *Cochlidionidae*, 71.
Synorhopalum, n. gen., 218.
Synthreopus, n. gen., 213, 214.
Syntomidae, Catalogue of the: Hampson, 158.
Syntomidae, List of N. American species, 158.
Syntomis abdominalis, 88.
 " *Hilda*, 88.
Syrbula admirabilis, 53.
Tæniocampa alia, 144.
 " *rubescens*, 144.
 " *subterminata*, 144.
Teleas Canadensis, n. sp., 78.
Thyreopinae, table of genera, 212.
 Tick, a Californian, 229.
Tingitidae, new species of, 301.
 Tinsley, J. D., articles by, 6, 45.
 Tobacco beetle attacking tobacco in barn, 194.
 Treffry, J. E., article by, 102.
Trichobius major, n. sp., 334.
Trigonophora periculosa, larva of, 47.
Tropidischia xanthostoma, 117.
Truxalinae of Arkansas, 53.
Truxalis brevicornis, 53.
Trypoxylidae, list of N. American species, 298.
Trypoxylidae, table of genera, 297.
Udeopsylla nigra, 121.
Ufeus plicatus, 25.
 Utah, new butterfly from, 12.
Vespa diabolica, 255.
 Walker, E. M., article by, 29.
 Warning colours and mimicry, contributions to theory of: Finn, 125.
 Wasps, classification of the Entomophilous, 145, 161, 212, 238, 291, 322, 345.
 Webster, F. M., articles by, 4, 15, 28, 73, 125, 130, 136, 194.
 Wickham, H. F., articles by, 21, 57, 81, 269.
Xestocrabro, n. gen., 169, 173.
Xyelidae, larvæ of, 127.
Xylocrabro, n. gen., 169, 173.
 Young, C., article by, 41.
Zeugophora, table of species, 86.

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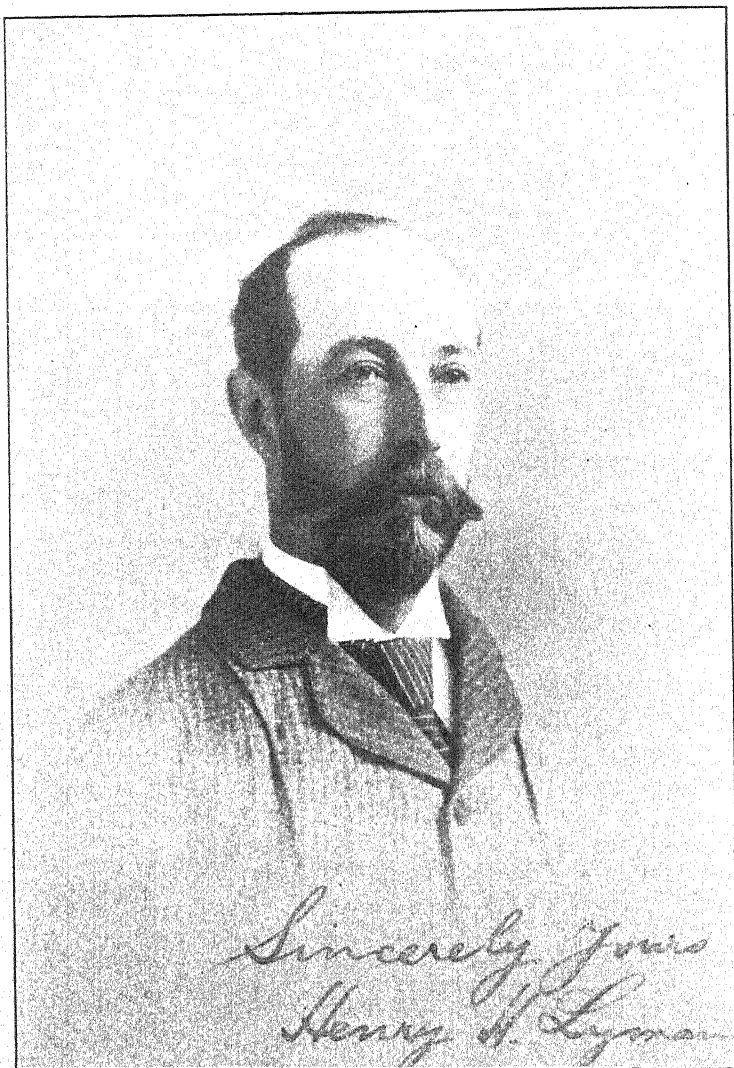
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HENRY HERBERT LYMAN, M. A.

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CONTENTS.

| | | | |
|---|----|--|----|
| Editorial—H. H. Lyman | 1 | Dyar— <i>Bombyx cunea</i> | 16 |
| Gibson—Note on <i>Danaïa archippus</i> | 2 | Lounsbury—Insect bites and effects thereof.... | 17 |
| Hempel—New <i>Coccidæ</i> from Brazil..... | 3 | Hancock—Tettigian group of Orthoptera..... | 25 |
| Grote—Neuration of <i>Argynnis</i> | 7 | Slingerland—Popular name for <i>Chisocampa</i> | |
| King—Bibliography of Mass. <i>Coccidæ</i> | 9 | disstria | 27 |
| Hulst—New genus and species of Phycitinae.. | 13 | Rehn— <i>Melanoplus differentialis</i> | 28 |
| Fyles— <i>Metzneria lapella</i> | 15 | | |

HENRY HERBERT LYMAN, M. A.

We have much pleasure in presenting to our readers, at the beginning of a new volume of the CANADIAN ENTOMOLOGIST, an excellent portrait of Mr. HENRY HERBERT LYMAN, of Montreal, who has recently retired from the Presidency of the Entomological Society of Ontario. He was born at Montreal, on the 21st of December, 1854, and received his early education at the West End Academy and the High School, winning at the latter the Davidson medal. At McGill University, to which he proceeded, he took the degree of B. A. (Logan medalist in Geology and Natural Sciences) in 1876, and M. A. in 1880.

In 1877 he entered the firm of Lymans, Clare & Co., wholesale druggists, in Montreal, which two years later assumed the present name of Lyman, Sons & Co. He is now senior partner and also president of the Lyman Bros. & Co. (Limited), Toronto. These business houses are widely known throughout the Dominion, and have always been distinguished for their upright dealing, energy and enterprise.

Mr. Lyman has also been an active member of the volunteer force; he joined the 5th Battalion, now the Royal Scots of Canada, in 1877, as an Ensign, and rose to be Major in 1885, with which rank he retired in 1891. He has further manifested his loyalty by becoming a Fellow of the Royal Colonial Institute, and a member of the Council of the British Empire League.

When less than eight years old he began to take an interest in insects, and to observe their ways, and when only twelve he started to form

a collection of Lepidoptera, which has now become one of the finest in Canada. His first printed observations on insects appeared in the 6th volume of this magazine (1874), and he has since contributed to seventeen of the succeeding volumes; he has also furnished useful and interesting papers to several of the Annual Reports of the Society. The value of his scientific work and attainments has been widely recognized. Since 1891 he has been a member of the Editing Committee of this magazine; in 1895 and '96 he was elected Vice-President of the Society, and in 1897 he became President. He held this highest place in the Society for two years, to the great satisfaction of the members, and retired at the last annual meeting. He is also a Vice-President of the Natural History Society of Montreal, and member of a number of Scientific Societies in the United States. For the last thirteen years he has been President of the Montreal Branch of the Entomological Society of Ontario, and has done more than anyone else to keep alive the enthusiasm of the members, and to encourage all who show any interest in the subject to persevere in the study. During all these years nearly all the monthly meetings have been held at his home, and the members have greatly enjoyed his generous hospitality.

Mr. Lyman is a notable example of what a busy man can do. Though engrossed all day long with the duties and cares of a very extensive business, which demands, more, perhaps, than any other, a close attention to innumerable details, he yet finds time not only for the pleasures of an energetic collector of insects, but also for the performance of much careful and conscientious scientific work. His published papers are valuable contributions to science, being always characterized by thorough accuracy of statement, and showing the results of painstaking and long-continued research.

NOTE ON DANAIS ARCHIPPUS, FAB.

On the 30th October last I found, on the grounds of the Central Experimental Farm, a chrysalis of *Danaïs Archippus*, Fab. This was attached to a twig of maple, about seven feet from the ground, and was quite green. When I had kept it in the office for two days it began to darken, and on the 4th November the butterfly emerged, but in a crippled condition. This occurrence is rather interesting, and the question arises, If the chrysalis had been allowed to remain on the tree, would it have given the butterfly this autumn or not until next spring? It would be interesting to know if any other person has observed the chrysalis of this butterfly so late in the season as the above, and with what results. ARTHUR GIBSON, Central Experimental Farm, Ottawa.

DESCRIPTIONS OF THREE NEW SPECIES OF COCCIDÆ
FROM BRAZIL.

BY ADOLPH HEMPEL, SAO PAULO, BRAZIL.

Subfamily Coccinæ.

Capulinia crateraformis, n. sp.

The ♀ makes a small crater-shaped gall in the bark of the limbs and twigs. This gall is about 1.5 mm. high, and consists of an outer circular ring from 1 mm. to 1.5 mm. in diameter, and a small cone within, which can readily be removed. The cavity inhabited by the insect is smooth and is lined with a white powder. The adult ♀ is small, oval in outline, pink, and is dusted with a white powdery secretion. Boiled in a solution of KOH it becomes colourless. Size, after boiling: length, .96 mm.; width, .73 mm.

Antennæ small, variable, usually of five joints, although joint 3 sometimes divides so that the antenna becomes six-jointed. Length, 97 micromillimetres. Approximate formula 31(24)5. Average length of joints in micromillimetres: (1), 27; (2), 13; (3), 35; (4), 13; (5), 9. The last joint bears a terminal brush of coarse hairs. First and second pairs of legs entirely wanting. Third pair of legs atrophied; without any visible articulations; and not ending in a claw. The legs are usually placed so near the posterior end of the body that half the length extends beyond the margin. Length, .177 mm. Rostrum large and well developed. Mentum apparently dimerous. Rostral loop long, coiled upon itself, and extending to the second pair of spiracles. The spiracles are chitinous and well developed, and from one to four small round spinnerets are grouped around each one. The derm is transversely wrinkled. The abdomen is segmented and ends in two short setæ. The genital aperture is guarded by four small spines. Around the margin of the body, and on the dorsal surface, there are scattered small spinelike hairs.

Male and larva not observed.

Hab.—Sao Joao d'El Rei, State of Minas Geraes, Brazil. On the limbs and twigs of *Eugenia jaboticaba*. Mr. Alvaro da Silveira collected this species, and writes that it causes much damage to this fruit tree. From a foot-note by Prof. T. D. A. Cockerell, in the "Journal of the New York Entomological Society," Vol. VI., Sept., 1898, pp. 174 and 175, it is apparent that this species also occurs in the State of Sao Paulo. In speaking of *C. jaboticabæ*, Ihr., Prof. Cockerell says: "Dr. Noack has also sent me some specimens *in situ*, collected by Dr. Campos Novaes at

Itatiba, State of Sao Paulo, and I find they live in little crater-shaped galls. The females have the antennæ with 5 or 6 segments." It is quite evident that the species which Prof. Cockerell examined was not *C. jaboticabæ*, but *C. crateraformis*.

The species of *Capulinia* may be readily separated by the following tabulated characters. Unfortunately, I have no material of *C. Sallei*, and the characters here given are taken from Sign. and Townsend & Cockerell.

| <i>C. jaboticabæ.</i> | <i>C. crateraformis.</i> | <i>C. Sallei.</i> |
|--|---|--|
| Length, 2.40 mm. | Length, .96 mm. | Length, 1.50 to 1.67 mm. |
| Antennæ of 4 to 5 joints. | Antennæ of 5 to 6 joints. | Antennæ a short tubercle. |
| Length of antennæ, 75 micromillimetres. | Length of antennæ, 97 micromillimetres. | |
| First and second pairs of legs entirely wanting. | First and second pairs of legs entirely wanting. | First and second pairs of legs represented by a sharp conical tubercle. |
| Last pair of legs articulated, and without a claw. | Last pair of legs not articulated and without a claw. | Last pair of legs not articulated, terminating in a claw. |
| Last pair of legs .302 mm. long. | Last pair of legs, .177 mm. long. | |
| Last pair of legs removed from the posterior margin. | Last pair of legs very near the posterior margin. | Last pair of legs removed from the posterior margin. |
| The female makes neither a gall nor a definite sac; the eggs being deposited in a fluffy mass of white cotton. | The female makes a small crater-shaped gall. | The female covers itself with a white cottony sac bearing a single long filament from the end. |
| 18 to 35 spinnerets around each spiracle. | 1 to 4 spinnerets around each spiracle. | |
| Hairs on margin and body long. | Hairs on margin and body short. | |

Subfamily Lecaniinæ.

Lecanium Silveirai, n sp.

♀ sub-circular to oval in outline, light red in colour. Dorsum convex, shiny, with a slight longitudinal median ridge; derm hard, depressed around the anal plates, and covered with a very thin layer of waxy secretion. Anal cleft short, with the sides contiguous. Arising on the ventral surface and extending up each side, are two lines of white powdery secretion. When removed from its resting place, it leaves a round patch of thin white wax behind. The specimens examined were 5 mm. long, 3.5 mm. wide, and 2 mm. high. It is probable that these specimens were immature, as none contained eggs or larvæ.

Boiled in a solution of KOH, the derm becomes soft and transparent, being chitinized only around the anal plates. Antennæ and legs wanting. Rostrum large and well developed, situated between the first pair of spiracles. Rostral loop long, extending to the anal plates. Anal ring apparently with ten hairs. Anal plates small, with the lateral angle rounded, and the antero-lateral side longer than the postero-lateral. The margin has two horseshoe-shaped incisions on each side, opposite the spiracles, in which the derm is thickened and chitinized. The spiracles are situated very near to these incisions, and are connected with them by many small round spinnerets. The tracheæ are large and many-branched. Around the margin of the body there are 2 or 3 rows of small hairs, each one arising from a small tubercle. The entire derm on both surfaces is covered with numerous large, round, nipple-shaped glands. These are dark brown with a light centre. Interspersed among these glands are a few hairs, and numerous small slender filamentous glands.

Hab.—Sete Lagoas and Diamantina, State of Minas Geraes. On the roots of grapevines, where it causes much damage. The specimens were collected by Mr. Alvaro da Silveira, on the roots of the Isabel grape. Mr. Amandio Sobral and Dr. Compas da Paz have known a disease for several years which they attribute to this insect. This species is of special interest to agriculturists and economic entomologists; and will be difficult to combat, because of its subterraneous habits.

Lecanium obscurum, n. sp.

♀ scale of young and half-grown individuals, green; the scale becomes darker with age, and is black in the old specimens. Shape elliptical, dorsum convex rounded, shiny, with minute patches of waxy secretion; the derm is finely granular, and wrinkled at the sides. On the

ventral surface there are two converging white lines on each side. Anal cleft .94 mm. long; sides contiguous. The largest specimens are 4.5 mm. long, 3 mm. wide, and 2 mm. high.

Boiled in a solution of KOH, it colours the liquid greenish. The derm is chitinated and retains a dark colour. It is not reticulated, but pitted with minute round hyaline spots. Antennæ of seven joints, all of which, except joint 3, bear hairs. Length 350-361 mm. Approximate formula 423 (17) (56), or 472 (13) (56). The antennæ are variable, but in all the specimens examined, joint 4 was the longest and joints 5 and 6 the shortest. Length of joints in μ : (1), 49; (2), 58-62; (3), 49-62; (4), 80-89; (5), 22-29; (6), 27-29; (7), 49-62. Legs ordinary; the coxa of the first pair of legs, with a short apical hair and several short spines; trochanter with the long side convex and bearing a long hair; the articulation between the tibia and tarsus is indistinct; tarsus with a constriction near the middle; claw short; digitules twice the length of claw, large, of equal size, bulbous at base, and broad and flat at the end; tarsal digitules slender, with the ends slightly expanded. Length of joints of first pair of legs, in μ : coxa, 80; femur with trochanter, 200; tibia, 120; tarsus with claw, 111; tarsus without claw, 89. The tarsi of the other legs are not constricted. Mouth-parts well developed, placed just posterior of the first pair of legs. Rostral loop short, not extending to the second pair of legs. Anal ring with ten hairs. Anal plates small; the outer angle rounded, the two outer sides nearly equal, the postero-lateral side being convex and just a trifle shorter than the antero-lateral. Around the lateral margin there is a simple row of small hairs placed wide apart.

♂ scale small, plain, white, very frail, composed of 7 lateral and 2 dorsal plates. General shape elliptical, the posterior part slightly narrower than the anterior; dorsum convex. Length, 1.355 mm.; width, .830 mm. Found on the branches and on the under side of the leaves.

Larva, just hatched, yellowish green in colour, oval in outline, with the posterior end of the abdomen slightly acuminate and ending in two long setæ. Eyes dark brown. Margin of body serrated and bearing a few short hairs. There are two groups of stigmatal spines on each side, each composed of two very short and one long club-shaped spines. Antennæ six-jointed, joints 3 and 6 about equal in length. Legs ordinary; claw long, tip well curved and slightly notched; the two

digitules are of unequal size, one being small and fine, with the end but slightly expanded; the other larger, with the end flat and widely expanded. Tarsal digitules also of unequal size, one being longer and thicker than the other. Rostral loop long, folded upon itself and extending to the anal plates. Length, .336 mm.

Hab.—Ypiranga, State of Sao Paulo. Abundant on branches of *Maytenus*, sp.

THE NEURATION OF ARGYNNIS.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

In my examination of the types indicated by Mr. Scudder I have been quite unable to separate *Acidalia niphe*, Scudd., Gen. 101, from the type of *Argynnis*. This latter type, *A. aglaia*, L., is characterized by the second radial branch of primaries running so close to the main vein, for a distance beyond the median cell, as to form a minute false accessory cell above the angle of the radius which the crossvein joins. Since this, as well as all other features, are repeated in the wing of *niphe*, I conclude the genus *Acidalia* of Hübner, as founded on this species, must be dropped. Another type, *Dryas paphia*, can hardly be retained as distinct from *Argynnis* from the neuration. The only difference is, that the second radial branch, in running propinquitous, leaves the main vein at somewhat before the point chosen in *aglaia* and *niphe*. Indubitably *paphia* is a species belonging to the same phylogenetic group, a trifle isolated. On the other hand, neither *Issoria lathonia* nor *Brenthis hecate* share the character of the appressed second radial branch of *Argynnis* and should be separated from this genus. The differences in the neuration between *Issoria* and *Brenthis* are very small and comparative; in both the second radial branch is not appressed and leaves the main vein above the median cell before the point of juncture of the crossvein. The point of departure in *Issoria* is a little outwardly removed and the propinquity is so great that one can see that it requires but little to make the branch decumbent. *Issoria* differs further by the angulate papery wings and by the fact that the crossvein on hind wings is but a faint scar between second median branch and cubitus. In *Brenthis* the crossvein is as in *Argynnis*, a rather strong scar, and joins inferiorly the third median branch; whereas in *Issoria* the point of juncture is opposite the first cubital branch. It is a small distinction, but it reveals the fact that in *Issoria* the breaking up of the median series has progressed further. A parallel difference, more widely expressed, separates the two series of the Satyrids.

I leave out of this series the generic types of *Melitæa*, which are more specialized by the entire disappearance of the crossvein between

second median branch and cubitus. This feature is shared by *Phyciodes*, which differs by its frailer wings. In all these types of the *Melitæa* series, the second radial branch has passed the point of juncture of the crossvein and arises from the radius at a point near where the appressed branch leaves the main vein in *Argynnis*. Thus the *Melitæa* series is more specialized than the *Argynnis* series, in which the second branch leaves the radius before the crossvein. The genera, except *Phyciodes*, separated by Mr. Scudder from *Melitæa*—i. e., *Lemonias*, *Euphydryas*—are all invalid from the neuration and texture of the wing.

There remains to discuss the genus *Euptoieta*. This is a specialized type, as shown by the passage of the second radial branch beyond the cell and by the open cell of secondaries. It seems to lead to *Agraulis vanille*, *Colanix julia* and *Dione juno*, in which the first radial branch has followed suit and the "long-wing" butterfly type is assumed. I differ from authors in considering these as Nymphalid or Argynnid types and not as related to the Limnads (*Anosia menippe*, etc.), and the "long-wing" type of *Heliconius*, in which latter the residuary features of primaries are quite apparent and the cells on both wings are closed.

BUTTERFLY LISTS.—A puzzled correspondent, who has been collecting and studying the butterflies of his own region of country for a score of years, has begun the preparation of a catalogue. At the outset he finds himself confronted with the difficult question as to what order he shall adopt in the arrangement of families and genera. He writes as follows: "I learned the sequence of genera, etc., from Mr. W. H. Edwards' plan, but I notice that every later author makes a plan of his own as to which genus precedes or follows. Now, probably no two men would exactly agree as to the sequence of genera, etc., but ought not all to agree as closely as possible, to avoid confusion, and not to place stumbling-blocks in the way of the learner?" . . . "Also, as to the division of one genus into several, there is a similar difficulty. For instance, Mr. Edwards' genus *Pamphila* contained over eighty species; Dr. Holland divides it into several genera, yet I doubt if any average Lepidopterist can separate the species according to Holland. Of what use, then, is the division, especially to a beginner? Simply, it is confusion." . . . "We should have a law, written or unwritten, forbidding any change either in the alteration of old names, or the addition of new ones, without the approval of a committee of competent men."

Our correspondent will assuredly have a large number of sympathizers. Every entomologist groans over the incessant changes in nomenclature that are being made. Some, no doubt, are justifiable and necessary, but very many are not and have soon to give way to others. It is high time that an "Entomologists' Union" should be formed to settle such questions as these, as urged by Mr. Lyman in his Presidential address of 1898.

BIBLIOGRAPHY OF MASSACHUSETTS COCCIDÆ — SUPPLEMENTARY TO CONTRIBUTIONS TO THE KNOWLEDGE OF MASSACHUSETTS COCCIDÆ.

BY GEO. B. KING, LAWRENCE, MASS.

The object of the present list is to bring together all the published records found by me to treat of, or give any reference to, Coccids known to inhabit Massachusetts up to August, 1899. Since then others have appeared and will be published when sufficient material is collected.

Cockerell, Theo. D. A., 1893.—Insect Life, Vol. VI., p. 103, he lists *Pinnaaspis pandani*, Comst., from Mass. under glass.

Cockerell, T. D. A., 1895.—Insect Life, Vol. VII., p. 43, is a note on *Chionaspis spartinae*, Comst., found at Woods Holl, Mass.

Cockerell, T. D. A., 1896.—CANADIAN ENTOMOLOGIST, Vol. XXVIII., pp. 222-224, he describes as new sp. *Ripersia Kingii*, *R. lasii* and *R. flaveola*, from ant-nests in Mass.

Cockerell, T. D. A., 1897.—Science Gossip, Vol. III., n. s., pp. 239-241, notes on all the known ant-nest coccids, and *Dactylopius Kingii* is described from Mass.

Cockerell, T. D. A., 1897.—Part L. of Bul. U. S. Nat. Muse., No. 39, p. 5, mention is made of the success of the writer collecting ant-nest species of coccids in Mass.

Cockerell, T. D. A., 1897.—Bul. No. 6, Tec. Ser. U. S. Dep. Agr., Div. of Entom., *Aspidiotus* (*Chrysomphalus*) *smilacis*, Comst., is recorded from Massachusetts.

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- Comstock, J. H., 1880-1.—U. S. Agr. Rpt., pp. 215, 225, 248, *Pinnaspis pandani*, Comst.; *Mytilaspis pomorum*, Bouché, and *Icerya Purchasi*, Mask., are cited from Mass.
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- adonidum*, L.); *Coccus arborum linearis*, Schr. (*Mytilaspis linearis*, Mod.), and *Coccus cryptogamus* (*Chionaspis furfurus*, Fitch.).
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- King, G. B., and Cockerell, T. D. A., 1898.—Ann. and Mag. of Nat. Hist., ser. 7, Vol. II., 1898, they describe *Kermes nivalis*, n. sp., from Lawrence, Mass.

- King, G. B., and Tinsley, J. D., 1897.—*Psyche*, Vol. VIII., pp. 150-151, *Dactylopius claviger*, n. sp., is described from ant-nests in Mass.
- King, G. B., and Tinsley, J. D., 1898.—*Psyche*, Vol. VIII., pp. 297-298, *Dactylopius Cockerelli*, n. sp., is described from Mass.
- King, G. B., 1897.—*Entomological News*, Vol. VII., pp. 125-129, Aphides and Coccids associated with ants. Among others are mentioned *Ripersia Kingii*, *R. lasii*, and *R. flaveola*, Ckll., from Mass.
- King, G. B., 1899.—*Psyche*, Vol. VIII., p. 312, *Ripersia lasii*, Ckll., is found infesting the roots of China Asters at Lawrence, Mass.
- King, G. B., 1899.—*Psyche*, Vol. VIII., pp. 334-336, *Chionaspis furfurus*, var. *fulva*, is described, with notes on other species. Prof. Cockerell has called my attention to a very bad mistake in my citation of the localities of *Chionaspis furfurus*, Fitch. (See *Psyche*, Vol. VIII., p. 335, and the sixth line from the bottom. It should read North Carolina, and not Northern California.)
- King, G. B., 1899.—*Psyche*, Vol. VIII., p. 350, *Aspidiotus hederæ*, Vall., and *Aulacaspis elegans*, Leon., are found in a greenhouse, imported from Bermuda.
- King, G. B., 1899.—CANADIAN ENTOMOLOGIST, Vol. XXXI., 1899, Contribution to the Knowledge of Massachusetts Coccidæ, I., pp. 109-112.
do. II., pp. 139-143.
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do. IV., pp. 251-255.
- Lounsbury, C. P., 1895.—The 32nd Ann. Rpt. of Mass. Agr. Coll. = Appendix=. This treats upon all known *Orthezia* to date, and cites *Orthezia insignis*, Dougl., from a greenhouse at Amherst, Mass.
- Lounsbury, C. P., 1895.—Bul. No. 28, Hatch Exp. Sta., Mass. Agr. Col., p. 23 and 26, cites *Gossyparia ulmi*, Geoff., and *Orthezia insignis*, from Mass.
- Marlatt, C. L., 1899.—*Science* for June, 1899, p. 835-837. The author criticises and doubts the validity of *Chionaspis furfurus*, var. *fulva*, King, from Massachusetts.
- Packard, A. S., 1869.—Mass. Agr. Rpt., pp. 257-261. The following species are said to be common in Mass.: *Aspidiotus bromeliæ* (*Aulacaspis bromeliæ* Kerner); *Lecanium platycerii*, Pack. (now unrecognized); *Lecanium filicum*, Boisd., and *Coccus adonidum* L., (*Dactylopius adonidum*, L.).

- Packard, A. S., 1871.—American Naturalist, Vol. IV., p. 686, substantially the same as the above.
- Packard, A. S., 1886-1890.—Fifth U. S. Rpt. Entom. Com., p. 537. It states that *Chionaspis furfurus*, Fitch., was described from Mass. on apple and pear.
- Pergande, Thos., 1898.—Bul. No. 18, n. sr., p. 27, U. S. Dep. Agr.; in his description of *Lecanium nigrofasciatum*, he cites it from Boston, Springfield and Deerfield, Mass.
- Parrott, P. J., 1899.—CANADIAN ENTOMOLOGIST, Vol. XXXI., p. 11, he describes *Aspidiotus Fernaldi*, var. *Cockerelli*, and states that *A. Fernaldi* is found on honey locust in Mass.
- Parrott, P. J., and Cockerell, T. D. A., 1899.—The Industrialist for March, 1899, p. 165, notes with formula of the antennæ of *Lecanium coffeæ*, from greenhouse at Lawrence, Massachusetts.
- Parrott, P. J., and Cockerell, T. D. A., 1899.—The Industrialist for April, 1899, pp. 233-235. Important notes appear treating upon *Lecanium cynosbati*, Fitch.; *L. tarsale*, Sign.; *L. nigrofasciatum*, Perg.; *L. quercifex*, Fitch., and *L. Kingii*, Ckll., all from Mass.
- Parrott, P. J., and Cockerell, T. D. A., 1899.—The Industrialist for May, 1899, pp. 276-277, mention is made of *Aspidiotus elegans*, Leon., and *A. Crawii*, Ckll., from Lawrence, Mass.
- Riley, C. V., and Howard, L. O.—Insect Life, Vol. V., p. 51, is a note recording *Gossyparia ulmi*, Geoff., at Boston and Brighton, Mass.
- Scudder, S. H., 1899.—Psyche, Vol. VIII., p. 299, *Ripersis lasii*, Ckll., is found infesting the roots of China Asters at Lawrence, Mass.
- Tinsley, J. D., 1899.—CANADIAN ENTOMOLOGIST, Vol. XXXI., p. 45, in his contribution to Coccidology, II., *Dactylopius Kingii*, Ckll., is reduced to a synonym of *Dactylopius sorghiellus*, Forbes.
- Tinsley, J. D., and King, G. B., 1899.—Entomological News, Vol. X., p. 37, they describe as new *Ripersia minima*, from Lawrence, Mass.

A NEW GENUS AND SPECIES OF PHYCITINÆ.

BY GEO. D. HULST, BROOKLYN, N. Y.

MONOPTILOTA, n. gen.—Palpi ascending, second article heavy, third short; maxillary palpi small; front broad, flattened, ocelli not discernible in undenuded specimens; antennæ of ♂, first joint much lengthened, swollen, followed by a decided, rather lengthened bend, hollowed on

the inside into a deep furrow or pocket its entire length, the edges scaled, becoming tufted on posterior edges outwardly; beyond sinus filiform; from beyond basal joint the antennæ are unipectinate, the pectinations one on each segment, filiform, being longest just beyond sinus, and these five or six times the diameter of the stem, each armed with straight parallel hairs on each side; end segments ciliate. Antennæ of ♀ filiform ciliate. Thorax and abdomen rather stout, the genital armature of ♂ prominent. Fore wings rather elongate, subtriangular, 11 veins, 4 and 5 separate, 6 from cell near angle, 8 on 7, 9 and 10 from cell. Hind wings broad, 8 veins, 2 near angle, 3 from angle separate from 4, 4 and 5 stemmed half their length, 6 separate from 7. Cell very short, not more than $\frac{1}{4}$ wing length. Legs as usual in the group, rather heavy.

A very peculiar genus, with *Ceara*, Rag., unique in the unipectinate antennæ of the ♂.

M. nubilella, n. sp.—Expands 21–23 mm. Palpi dark fuscous, lighter on inner side; front fuscous, much darker in front of eyes; in one specimen purplish in middle, antennæ fuscous; thorax fuscous, with purple tint more marked in front, and lightening into grayish behind; abdomen fuscous to light fuscous-gray, somewhat purplish on anterior segment. All the segments darker lined; fore wings dark fuscous, broadly shaded with blackish longitudinally on veins, and lightened with white scales on anterior half, and submarginally making these portions gray, with blackish dashes of ground colour, the gray being most decided on sub-basal and central anterior portions. Over the wings on the intervenular spaces is a purplish stain, more evident posteriorly; cross lines faint, whitish, the inner shown mostly by the heavier dark angulate, somewhat diffuse, blackish outer shading, the outer fine, rounded outwardly in middle, with indistinct dentate tendency; discal spots geminate, black; marginal line broken, black; fringe fuscous. Hind wings dark smooth fuscous, lighter basally and along inner margin, the lines darker. Beneath even smooth fuscous, the fore wings the darker; marginal line blackish.

Specimens from National Museum and Department of Agriculture, taken in Maryland, Florida and Alabama. The insect, which promises to be of considerable economic importance, will have its habits and history made known by the Department of Agriculture. The type number in National Museum collection is 4393.

METZNERIA LAPPELLA, L.—A CURIOUS LIFE-HISTORY.

BY REV. THOMAS W. FYLES, SOUTH QUEBEC.

In the beginning of September, 1898, I discovered, in the heads of burdock (*Lappa major*, Gærtn.), a curious larva, of which the following is a description :

Head bilobed, brown. Mouth organs large. A brown plate, marked longitudinally with a white line, on the second segment. Body rounded, much crinkled, of a fatty appearance, having a few white hairs along the sides. Anal segment small and protruding. The legs small and weak. The pro-legs seemingly atrophied into mere pseudopodia. Length of larva, two and a half lines.

On the approach of winter, the larva, having eaten out a convenient hollow in the closely-packed seeds, cemented its surroundings together, and then lined its cell with a flocculent white cocoon. In this it remained unchanged till the beginning of June, when it went into chrysalis.

The pupa was of elegant shape, amber-coloured—the head parts darkening into brown. The antennæ and legs were traceable through the skin. The length of the pupa was three lines. The moths appeared in the end of June and continued till August. They mated about the middle of July.

The dimensions of the perfect insects were as follows :

Expanse of wings (♂) $5\frac{1}{2}$ lines, (♀) 9 lines. Length of body (♂) $2\frac{1}{2}$ lines, (♀) 4 lines. Length of antennæ (♂) 2 lines, (♀) 3 lines.

The eyes of the moth were large and prominent, in colour they were a rich brown. The palpi were reflexed—the second joint was long and had long scales, and the terminal joint was pointed. The antennæ were filiform, prettily encircled with minute short bristles at the joints. The proboscis was long and coiled up watch-spring fashion. The body terminated with a tuft like a paint brush. The tibia in the hindmost pair of legs had two pairs of spurs ; that in the second pair of legs had but one pair.

The fore wings were of a pale sienna-brown, with a patch of darker brown extending along the costa and towards the inner margin for two-thirds of the length of the wing. There were three or four lines of darker scales towards the hind margin and following its curve. Some of the specimens had the three dots on the disk, spoken of by Stainton (*Man. of Bh. But. and Moths*, Vol. II., p. 348).

The hind wings were slate-coloured, and had long fringes of the same hue.

The eggs of the moth (obtained by pressure) were very minute, globular, smooth and white. They are dropped probably into the flower-head of the plant, for the most careful microscopical examination showed no opening made by a larva through the involucre.

On August 4th I found the newly-hatched larva biting into the side of one of the outer seeds. The seeds at this time were white and tender. The body of the larva was white, waxen and semi-translucent.

The insects were identified for me by Lord Walsingham and Mr. J. Hartley Durrant. To them also I am indebted for the correction of the generic name from *Parasia* to *Metzneria*, Zeller.

It may be asked, How was this European insect advanced to Canada? This probably is the correct answer: At Point Levi there is a quarantine station for cattle, and Old Country hay and straw are often landed with the cattle, and burs containing larvæ of the species have at some time been landed with the fodder. The burdock is plentiful on all our roads.

BOMBYX CUNEA, DRU.

The latest communication of the Rev. T. W. Fyles on this subject may be briefly corrected by the following synonymy:

SPILSOMA, Steph.

prima, Slosson.

cunea, Fyles (nec. Drury).

congrua, Walk.

antigone, Strk.

HYPHANTRIA, Harris.

cunea, Dru.

punctatissima, S. & A. (et al.)

var. budea, Hubn.

textor, Harr. (et al.)

There can be no manner of doubt of Drury's figure. It represents the spotted form of *Hyphantria*. The description of the abdomen, at the last resort, is conclusive. The only point in doubt, as Dr. Ottolengui says, is as to the possible specific distinctness of *cunea* and *budea*. But Mr. Lyman is at work upon this, and may be able to give us some results later on.

HARRISON G. DYAR, Washington, D. C.

INSECT BITES AND THE EFFECTS THEREOF.

BY CHARLES P. LOUNSBURY, DEPT. OF AGRICULTURE, CAPE TOWN, S. AFRICA.

The letter from Dr. Behr, under the caption, "A Californian Tick," in the August issue of the CANADIAN ENTOMOLOGIST, bears on a subject becoming fraught with interest to many investigators engaged in public service. It is with the object of stating my crude ideas on the matter, that of serious and exceptional effects sometimes following insect bites, and of relating my experience with man-attacking ticks, that I contribute this note. First, I think that a distinction should be drawn between the sting or bite of insects (I use both "bite" and "insects" broadly) that seek their prey for food only, as mosquitoes, ticks, and bugs, and those whose attack is primarily and purposely to inflict injury, as centipedes, spiders, and many hymenopterous insects. It is with the former class only that I now concern myself.

There seems to be an object in all the intricate relationships between the various forms of life, and, in general, we have not far to seek in ascertaining the object of any severe injury to one form by another. Rarely, if at all, do we find an organism wantonly inflicting injuries that must act directly for its own destruction. A mosquito, a flea or a tick seeks an animal to supply itself with food; and injury beyond that necessarily caused in puncturing the skin and in stimulating the flow of blood from the tissues beneath appears to be unnatural and abnormal. This direct injury, unless immensely multiplied, is, I incline to believe, never of a serious nature to a man or any other animal in a normal state of health. For *Argas persicus* to inflict a bite which of itself proves fatal seems monstrous. The destruction of the life of a man would not benefit the tick, when all it requires is but a mere drop of blood; and, on the other hand, for its bite to prove fatal would soon bring the tick to the verge of eradication. The case is quite different with the insects that consume much of their host, as hymenopterous parasites for instance, for they utilize their host to the utmost whilst destroying it.

Reasoning thus, and influenced doubtless by recent discoveries in the transmission of certain diseases by the agency of insects, I have come to believe that the direct injury inflicted by any individual insect when seeking a temporary supply or food is very rarely of a serious nature to a host healthy in mind and body. When the number of parasites is immensely multiplied, serious consequences may follow, but then we approach the condition instanced in the case of hymenopterous parasites. Apparent

exceptions to this rule do exist, but for most that have occurred to me I believe there is a reasonable explanation. For example, a single tick may paralyse a sheep or cause serious lameness in a horse, but only because the tick has chanced to insert its rostrum into particular tissues; in these cases, I have known the removal of the tick to afford almost immediate and entire relief.

An idea of this sort is at most a theory, but much support for this one may be obtained by its satisfactory application. As to how it is that various disorders, often of a serious and even fatal character, are induced or rather follow the attack of particular insects, even in limited numbers, I can only express the opinion that the effects are due, not to the primary injury, but to the incidental transmission of an organism quite as foreign to the attacking parasite as to its host. Thanks to American investigations, scientific research has shown that the Texas Fever organism is transmitted by ticks. I have affirmed this discovery in South Africa, and can add that we have ticks innumerable and of the same species in non-fever districts as we have where the fever is most prevalent; and further, that ticks were known in the present fever areas long before the disease spread into the Colony. Major Bruce, by his labours in Zululand, has demonstrated that the bite of the notorious Tse-tse Fly is only fatal because of the incidental introduction of an infusorial parasite. Dr. Koch, I understand, is now connecting malarial fevers with mosquitoes in an analogous association. Ticks are the cause of sheep dying in Great Britain because they may transmit to their host the bacillus of Louping Ill. Other instances still might be cited, but these I think are sufficient to impress one with the fact that insects are often only unconscious agents, not principals, in causing serious consequences through their bites.

The simple bite of an insect varies in its effects with different subjects, but, as Dr. Behr remarks, the variations seem due to personal idiosyncrasy. A Kafir laborer, treading on an Acacia thorn, will simply grunt, and after withdrawing it from his foot will go on unconcernedly with his work, although it may have pierced his leather-like sole a full inch; a European would be brought to the verge of tears, and might think himself incapacitated for further work during the rest of the day. Just so a native is as little annoyed with head-lice as a dog is with fleas, and sleeps soundly in his squalid hut while bed-bugs carouse over his naked body. From the vermin-seasoned, unfeeling savage to the super-sensitive product of civili-

zation there are innumerable gradations, and hence some variations in the effect of simple insect bites.

Some variation is due to other factors. Bites may be followed with less pain if the insect is allowed to work undisturbed. As a child, I was taught not to slap mosquitoes until they were ready to depart, and my impression is that following this instruction has saved me suffering. Persons bitten by Argasids have told me the pain is always greater if they disturb their tormentors. I have not tested this assertion, but I know that the bite of Argasids left to finish their meal in peace is trifling in after-effects compared with that of Ixodids which have been disturbed by forcible removal; one must remove the latter class of ticks or suffer their presence a number of days. Even if one of the latter kind has not fully inserted its rostrum preparatory to feeding, the after-effects are relatively more painful. Again, the structure of a tick's rostrum is such that forcible removal of the body often leaves a portion of the organ imbedded in the flesh. Large and painful festers may be thus initiated, which, if not properly attended to, may lead to serious consequences. Further, tick bites may be made more painful by indiscreet scratching or by irritation from one's clothing. In May last, while absorbed in watching larval ticks on grass tops, I became covered with the little fellows. Many worked their way through my clothing and my body in places was soon stippled with attached ones. Instead of smearing these with oil and leaving them to detach themselves, a measure which prevents almost all further irritation, I simply scrubbed them off in my bath. The result was innumerable painful though minute festers on my ankles and back. One cannot easily reach his back between the shoulders, and there the inflammation and pain soon subsided; but for ten weeks my ankles, which came in for scratchings without number and were also in continual friction with my boots, remained painfully sore. Occasional injury beyond that incidental to the bite may be caused, I suspect, by the introduction of the organisms found in abscesses (such as *Streptococcus pyrogenes*). The attack of a certain cattle tick in this country is not uncommonly followed by the formation of an abscess, and it may be that in this case the tick or ticks had previously feasted about a similar sore; certain it is that many are often to be found clustered about great festers.

Dr. Behr, like myself, scouts the supposition that *Argas persicus* inflicts a fatal wound. He suggests that the fatality may be due to the coincident occurrence of malaria, and mentions that malarious fevers

are very common in the region where the tick is recorded to occur. He considers *A. persicus* a local tick, and hence has seemingly thought it indiscreet to couple the tick with the malady as a transmitter of the latter from person to person. But there is good ground for considering *A. persicus* a widespread creature. A fowl-attacking tick in India is referred to the species, and also one in Australia. From a comparison of specimens from these countries with specimens of *Argas americanus* from Texas and with the common fowl tick of South Africa, Claude Fuller (now Natal Entomologist) and myself concluded that all were of one and the same species; on referring South African material to A. D. Michael, the well-known English authority on the group, we were told that our ticks presented no differences to *A. persicus*, and, moreover, that *A. persicus* was probably nothing more than the European *A. reflexus*. The *A. columbae* mentioned by Dr. Behr, it may be added, is given by Neumann as a synonym of *A. reflexus*. Thus the historical, man-killing tick of Persia appears to be now found on five continents. This is not at all remarkable, for a parasite common to many birds like this one is readily distributed. Two trustworthy correspondents of mine say they have been bitten by our South African *Argas*, but both scoff at the idea of serious consequences ever following the bite. To note the effect of the bite myself, I recently permitted a long-starved specimen to refresh itself from my arm. It remained on sixty-five minutes, and then, loosening its hold, crawled off. In this time it had distended itself fully. The wound took a fortnight to heal, but I scratched the scab off several times when not thinking; otherwise it might have healed in a shorter time. The swelling and inflammation were slight, as was also the usual exudation of serous matter. The annoyance was limited to an occasional trifling itch such as the presence of a flea at work occasions me.

Further evidence indicative of the disease-transmission theory is afforded by the circumstances surrounding another tick whose bite is considered serious to man in some parts. I refer to *Onithodoros Savignyi*, Audouin. This is an African species which mayhap be identical with the very one which prompted Dr. Behr's letter.* This tick, in common with mosquitoes and certain other flies, is credited with the spread of fever by

*Neumann in his monograph does not give extensive ground for separating *O. Savignyi* and *O. turicata*. In this country, natives are known to carry the tick unintentionally with their belongings from place to place. It might easily have been introduced into America with slaves in the last century or earlier, just as negroes, returning to Africa, are said to have introduced here the Jigger Flea (*Sarcopsylla penetrans*); this latter insect continues to spread, and is now found as far south as Durban, Natal.

some of the native tribes in Rhodesia; and the Namaquas, near the Orange River mouth, who have a perfect dread of it, and who will not rest in situations they suspect to be infested, also believe that it induces serious illness. David Livingstone heard stories to the same effect from the Portuguese in East Africa, and in his "Travels in South Africa," page 383, he thus describes the effects of the bite, apparently as experienced by himself: "These are," he says, "a tingling sensation of pain and itching, which commences ascending the limb until the poison imbibed reaches the abdomen, where it soon causes violent vomiting and purging. Where these effects do not follow, as we found afterwards at Tete, fever sets in; and I was assured by intelligent Portuguese there that death has sometimes been the result of this fever."

Now this tick, commonly known as "tampan," is spread far and wide in South Africa, and I am told is exceedingly common in the huts of natives in some parts. In the dry north-west of this colony, everybody seems to be acquainted with it and its bite. It is frequent at the uitspans (that is, places to rest the transport animals), and hence travellers nearly all receive its attention. But in these parts little more is thought of its bite than that of the bed-bug; and to my predisposed mind it has occurred that all the stories of serious effects come from notorious fever districts. Somewhat more than nine months ago I was favored with a collection of specimens from a Transvaal correspondent. He obtained them from an outhouse on his farm which had become infested simultaneously with the arrival of a batch of Bechuana natives from their own country. These tampan have been kept in a glass tube, and their long fast has made little difference in their appearance. They lie motionless in the dry earth enclosed with them and patiently await a host. Until I read Dr. Behr's letter, now two months ago, I had not "screwed up" sufficient courage to let any of the repulsive creatures repast at my expense, but his remarks decided me. On September 8th, I fed one in the morning and one in the afternoon. Both were simply placed on my arm, and they attended to their wants without further invitation. Neither was restless, but immediately scratched a hole and began. One staid on an hour and the other two hours. There was no sensation of pain in either case, but an exudation of a transparent fluid was observed to collect beneath the body of the tick, and the evaporation of this appeared to be responsible for a slight sensation of cold or numbness; at times, too, there was a slight tickling. At the conclusion of the respective banquets, each

was fully distended with blood. When they left, there were slight inflamed spots about two millimetres in diameter, but no abrasions visible, so neatly had the operations been performed. The next day the spots were somewhat swollen, and on the next there was a slight exudation of serous matter. There was, however, no pain beyond an itch when I was tired and sleepy. On the night of the third day I was taken violently ill with purging, accompanied by profuse perspiration and weakness. For a short time I was happy in mind (though not in body) with the thought that the ticks had given me an up-country "fever," but to my disappointment no fever set in; indeed it was two or three hours before my temperature rose to anything like the normal, from which it had dropped nearly three degrees during the acute distress. The following day I consulted the Colonial Medical Officer, and our conclusion was that while the attack might possibly have been induced through the ticks, the odds were much in favour of ptomaine poisoning; the fact that I had partaken of shop-made sausage a few hours previous to the illness favoured the latter view. Therefore it was desirable to have a fresh test conducted, and as, if the trouble arose from the ticks, there was a possibility of my now being immune, I was not a favourable subject. The Chief Inspector of Sheep for the Colony, A. G. Davison, volunteered to accept the risk, and at once a tick was placed on his arm. In forty minutes its distension was complete and it relaxed its hold. On the next day, feeling stronger myself and too enthusiastic to decide the doubt to heed any danger, I applied another specimen to my own arm; this one was a mature female, and when it withdrew fifty minutes later it had swollen to ten millimetres in length by seven in breadth. The critical third night passed without mishap either to Mr. Davison or myself. Nearly two months have now elapsed, and still none of the looked-for symptoms have appeared; and I feel convinced that the sausage was responsible in the first instance. The wound on Mr. Davison's arm healed in ten days. All three on my arm took at least a fortnight, and the last nearer three weeks, but I am less robust than Mr. Davison. The swelling in no case was more than trifling, and the inflammation, also slight, lasted but three or four days. I carefully watched for a rise in temperature after the last bite, but none took place. All this detail is mentioned to show that the tick has had a fair trial, and has failed to maintain its evil reputation. But however much one may doubt native traditions, one cannot refuse to credit Livingstone's account; and therefore my opinion is strengthened that in some sections the tick is the

transmitter of fever germs. The creature is long-lived, and while it requires few meals, perhaps only one in each moult, it may take the different meals from different persons. Parties native or long resident in fever districts often become, in a measure, immunized to the disease; but tam-pans, from feeding on the blood of such parties, might derive organisms which, transferred to susceptible newcomers, would induce a serious attack of the complaint. Students may shake their heads over this, but the transmission of fever in this manner would not be one whit more remarkable than the transmission of Texas Fever in cattle through a similar agency. When studying the metamorphosis of a certain cattle tick recently, I unintentionally gave this disease to a cow located far from any infected area, stabled night and day, and fed entirely on dry forage. The case was diagnosed by the Colonial Veterinary Surgeon, the best authority in the country, so its determination admits of no doubt. But the strange part is that the ticks inducing the disease must have had it transmitted to them from the mother tick; this had been collected in a Texas Fever area *ten months before*.

To refer again to *Argas persicus*, the change in location of a settlement affording temporary relief to the Persians may be explained without considering the relief evidence of very local distribution of the pest. All is, the tick only becomes abundant where its food supply is located. It does not multiply rapidly, but takes its meals so infrequently that its round of life is an extended one; therefore, after a few years an abode may become teeming with them. If such a place be occupied after a long period of disuse, the occupant would draw a multitude of the creatures from their lurking places; the presence of a clean-skinned stranger among the dirty inhabitants might also bring out the enemy in unusual numbers. In the long interval between its meals, the tick secretes itself away from its host just as a bed-bug does. Therefore the removal of the inhabitants and their scanty belongings leaves all or nearly all of the pest behind, perhaps to take a year or several years to starve to death. If the people change their location simply to get away from their vermin, it is probable that they look over their chattels to see that none is carried to the new quarters, and thus for a while they may have complete relief.

The apparently local distribution of *O. Savignyi* in parts of South Africa may be explained as I explain that of *A. persicus*. In the north-west of this Colony, *O. Savignyi* has the name of occurring almost solely in the shade of the Cameel Doorn (*Acacia giraffæ*). No experienced

traveller to those parts, I am told, rests himself or his horses under that tree. Elsewhere in the north-west certain other vegetation is avoided by the knowing ones. Away from these plants, one may rest with little risk of attack, but beneath them he will generally soon find things altogether too lively for comfort. I have sought an explanation from travellers, and have this plausible one from a surveyor, who is also an observant naturalist: The Cameel Doorn is the most common tree in those sun-scorched, sandy parts, and offers almost the only available shade to horses and cattle. These animals therefore seek that tree, and there they are frequented by the tampan, which, it should be stated, attacks horses and cattle as freely as men. Certain other vegetation may shelter sheep and goats, but these are not found in all localities. My informant had never watched the small stock to notice if the tampan attacked it, having taken this for granted; but he had observed that it was only in small stock districts that it was necessary to avoid low bushes which afford shade as well as the higher Cameel Doorn. The inference is that there is a triangular association between shade, animals, and the tampan tick. That no tree or plant is necessary for the welfare of the tick is evidenced by the fact that in some parts of the country it takes up its abode in native huts. The thatched roof and basket-work wall of a hut gives them the necessary shelter. On the veldt, they usually appear from the sand. It is motion, not sound or scent, apparently, that attracts them, but this statement requires elaborate experimental confirmation.

In conclusion of these somewhat disjointed remarks, I trust that they, in conjunction with Dr. Behr's letter, will have influence in arousing more interest in the somewhat neglected subject of insect bites and their effects. There are many lines open for original research, and there is a distinctly economic phase to some. For instance, if it can be demonstrated that fowl ticks, and other poultry parasites that alternate periods of rest away from the host with their gormandizing, may and do communicate diseases, as seems likely, an important public service will have been rendered. That demonstration would have greater influence with the farmer in inducing him to wage effective war against the vermin than a score of bulletins describing the insects and suggesting remedies. In this Colony we are now striving to prove a connection between our worst sheep and goat disease and ticks; and if we succeed, as now seems probable, we anticipate an immense "boom" in tick destruction, and consequent improvement in stock of all kinds.

NOTES ON SPECIES OF THE TETTIGIAN GROUP OF ORTHOPTERA.

BY J. L. HANCOCK, CHICAGO.

An interesting addition to Orthopteran distribution in the West Indies is the finding by Mr. R. J. Crew of the species *Neotettix quadriundulatus*, Redtenbacher, on the Island on Haiti.

Eight specimens, kindly presented to me, were taken around Port au Prince, and, as Mr. Crew informs me, were "swept from plants along the banks of a small stream." I have identified this species, which was first described by Brunner and Redtenbacher, 1892, from the Island of St. Vincent, West Indies, in "Proceedings of the Zoological Society of London," and an excellent figure is to be found on Plate xvi, fig. 10. Here it is recorded as a *Tettix*, but subsequent study has shown its closer approximation to *Neotettix*, Hancock. Species of the latter genus occur on the mainland of the southern United States and Mexico. The above species was recorded "numerous" on the Island of St. Vincent. Mr. H. H. Smith found it at Chateaubelais, also at the south end of the island, near the sea, under decaying leaves. Brunner, 1893, again records this species from the Island of Grenada, at Mount Gay Estate, Caliveny Estate, Balthazar, in "Orthoptera of the Island of Grenada," Proceedings Zoological Society of London.

From a series of *Tettigideæ* kindly furnished me from Mexico by Mr. O. W. Barrett, I am able to describe two new species of the genus *Tettigidea*, Scudder :

Tettigidea jalapa, sp. nov.

Rather large. Eyes prominent. Above fusco-ferruginous, dark fuscous over entire face and the sides, the last few segments at the end of the abdomen pale, legs pale throughout, the maxillary palpi a little depressed apically and very light, below the edges of prominent points and abdominal rings light. Body long, granulate. Vertex a little wider or subequally broad with an eye; nearly flat, hardly advanced in front of the eyes, widening posteriorly, the front border very little convexed, passing latterly into small rounded and somewhat elevated carinæ ending abruptly near the anterior inner border of the eye; on either side and just behind are the very small lobes situated about the middle inner margin of the eyes in small sunken fossæ; mid-carina rather thin, extending backwards only as far as the ending of the lateral carinæ, but very little elevated, in front insensibly coalescing with the frontal costa;

in profile the apex obtusely rounded angulate, the frontal costa depresso-convex in front of the eyes and advanced in front of the eyes about one-fourth their width; below the face is moderately declined; as seen in front the frontal costa is strongly sulcate, the branches commencing near the apex in front are gradually divergent to the middle ocellus, where they are more than usually separated. Eyes very prominent and globose. Antennæ very slender, reddish, inserted a little above and in front of the anterior inferior border of the eyes. Pronotum anteriorly angulate, the sides substraight, posteriorly long and subulate; the apex acute, passing the posterior femora; dorsum smoothly granulate, with no longitudinal wrinkles, or scarcely a vestige of vein-like arrangement of the granules between the shoulders; median carina distinctly elevated, nearly straight or gradually arched a little higher between and a little in front of the shoulders; humeral angles very obtuse, surface of dorsum between them tectiform; the anterior carinæ are curved, becoming a little divergent posteriorly; the borders of the posterior angle of the lateral lobe nearly form a right angle, acute at the apex; the posterior margin is straight and vertical. The elytra are nearly smooth externally, with a short thick oblique pale line very near the apex. Femora normal, the anterior and middle femora somewhat slender; the posterior femora rather broad, the first article of the posterior tarsus equals the third in length; the pulvilli subrounded below, the third is little the longest.

Length: body, ♂, 12 mm., pronotum 13 mm., post. fem. 7 mm. The wings extend beyond the apical process of the pronotum one millimetre.

Locality: Jalapa, Vera Cruz, Mexico, 4000 ft. elevation. June, 1898. O. W. Barrett.

Tettigidea chichimeca australis, form. nov.

Body rather small, fuscous, above ferruginous obscurely clouded with fuscous; face below the eyes light, spreading laterally over the lower portion of lateral lobes, pale underneath the abdomen; femora light, obscurely clouded; tibia a little more distinctly striped with fuscous. Vertex scarcely narrower than an eye, obtusely angulate in front, a little produced in front of the eyes, the front margin formed of little lateral carinæ directed obliquely backwards and ending near the anterior inner angle of the eye, where the eye is a little conically elevated, feebly sulcate on each side longitudinally, the little lobes not very distinct, middle carinated, posteriorly extending only as far as the lateral carinæ, anteriorly coalescing with the shining frontal costa; in profile the vertex is obtusely

rounded, advanced in front of the eyes about one-third their breadth, the frontal costa convexed, the distance between the anterior margin of the frontal costa and that of the eyes widening considerably below; the face below imperceptibly continued and quite declined; the apex is strongly obtusely rounded. As seen in front, the frontal costa is sulcate rather deeply, commencing near the apex, the branches are from here to the middle ocellus sub-parallel, and not divergent as in *jalapa*. Pronotum with the dorsum anteriorly obtusely angulate, the sides a little convexed, posteriorly subulate acute, passing the hind femora; dorsum granulate, with an indistinct longitudinal wrinkle on either side running parallel with the humeral angles, otherwise scarcely rugose; median carina distinctly elevated, gradually but slightly arched between the shoulders, sloping to the front margin; anterior lateral carina near the front sub-straight and subdivergent posteriorly; humeral angles strongly sloping laterally, as seen in front obtuse, between the shoulders convexed, the median carina clouded with fuscous. Elytra almost smooth, dark externally, marked with a minute light oblique line near the apex. Wings extended beyond the apex of pronotum. Femora with the carinae unchanged, the posterior femora quite large, the first and third articles of the posterior tarsi about equal in length, all the pulvilli of equal length.

Length: body, ♂, 9 mm., pronotum 9.5 mm., post. fem. 5.5 mm. Wings extending about one millimetre beyond the process of pronotum, making the total length 11 millimetres.

Locality: Cuernavaca Morelos, Mexico. May, 1898. O. W. Barrett.

This species is so closely related to *Tettigidea chichimeca*, Sauss., that I place it as a dimorphic form.

A NEW POPULAR NAME FOR *CLISIOCAMPA DISSTRIA*.

For many years this insect has been popularly known as "the forest tent-caterpillar." During the past two or three years it has attracted much attention in New Hampshire, Vermont, and New York, from its ravages in maple forests, city or village maple shade trees, and in many orchards. In orchards it has often worked with its near relative, the apple tent-caterpillar (*Clisiocampa americana*). Every one who critically observes the habits of these two species of caterpillars soon discovers that "the forest tent-caterpillar" is a very misleading name for *Clisiocampa disstria*, because its caterpillars never make a tent, while the apple tent-caterpillars always do. Several who have seriously discussed these insects recently have felt the necessity of a new popular name for *Clisiocampa disstria*. Professor C. M. Weed, of New Hampshire, when writing his recent excellent bulletin on the pest, asked me to suggest some

change in the name. But after considering such names as "the forest caterpillar," "the forest *Clisiocampa*," "the spotted forest caterpillar," "the maple *Clisiocampa*," I was unable to suggest any good substitute for the old name. Recently, however, while again cogitating on the subject, the name of "forest tentless caterpillar" suddenly appeared on the horizon of my thoughts. It seemed hardly the thing at first, but the more I thought of it the more appropriate it seemed. I brought the name before the Entomological Club, the *Jugatae*, here at Cornell University, and all agreed it was a very apt and easy way to solve the problem. The name of "forest tentless caterpillar" retains all of the "old associations;" it is not a radical nor a difficult change to become accustomed to, and it expresses the characteristic difference between the habits of the caterpillar and those of the apple tent-caterpillar. I would therefore here propose that *Clisiocampa disstria* be properly known as the forest tentless caterpillar. Are there any serious objections to this name, or has anyone a better one to suggest?

M. V. SLINGERLAND, Ithaca, N. Y.

MELANOPLUS DIFFERENTIALIS IN NEW JERSEY AND PENNSYLVANIA.

Professor J. B. Smith, of New Brunswick, N. J., first reported this grasshopper in this section, as occurring in cranberry bogs in New Jersey. In 1896 specimens were taken by Mr. W. H. Wensel, of Philadelphia, in Southern Philadelphia ("the Neck"); by Mr. S. T. Kemp, of Elizabeth, N. J., at Camden, N. J.; and by Mr. C. Fen Seiss, of Philadelphia, on August 26th, the latter on a window-sill in the centre of the city. Mr. Seiss has in his collection four specimens taken in 1897, on August 2nd, September 11th (two specimens), and November 6th—all from Philadelphia. The writer secured five specimens on September 5th and 11th at League Island and Philadelphia Neck, Philadelphia Co., Penn. They were collected on the large leaves of weeds, except one taken on a cement walk. In the same year specimens were taken at Riverton, Burlington Co., and Westville, Gloucester Co., N. J., by Mr. H. L. Vienck. In 1898 they first appeared mature about August 1st, in the streets, on lots, and even in the iron manufacturing sections of the city, where there is absolutely no vegetation. Their number was greatly increased, and they appeared to be firmly established. The year 1899 presented this species as a rather common grasshopper from August to October, with all the territory surrounding this city occupied by it. The range of this species this far east (Smith's record) was doubted by Scudder (Rev. Melan., p. 353), but he adds in a foot-note that he later noticed specimens in the collection of the American Entomological Society of Philadelphia from Camden Co., N. J. The range of this species to the north or south of this section I do not know, but I think it has come east to stay, as it seems to take possession of everything and thrive in its new location.

JAMES A. G. REHN, Acad. Nat. Sci., Philadelphia.

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CONTENTS.

| | | | |
|---|----|---|----|
| Pergande—New plant-louse on violets..... | 29 | Dyar—North American Yponomeutidae..... | 37 |
| Banks—On two genera of Mites..... | 30 | Baker—Four new species of Platymetopius.. | 49 |
| Coquillett—New genera and species of | | Webster and Mally—The Purslane Saw-fly.. | 51 |
| Ephydridæ..... | 33 | Howard—Popular name for Clisiocampa | |
| Harnes—New species and varieties of Lepi- | | distria..... | 54 |
| doptera..... | 42 | Johnson—The destructive green-pea louse.. | 56 |

A NEW SPECIES OF PLANT-LOUSE INJURIOUS TO VIOLETS.

BY THEODORE PERGANDE, WASHINGTON, D. C.

Among several species of insects which have lately come to the notice of the Division of Entomology of the U. S. Department of Agriculture, through their ravages upon greenhouse violets, is a little species of plant-louse known to florists as the black or brown aphid. The species is now very generally distributed in the United States and occurs in Canada, although it was not known until within five or six years from the time of writing. As it appears to be undescribed, I propose the specific name *violæ*, and have placed it in the genus *Rhopalosiphum*, to which it appears to belong. The following description is submitted, pending a more detailed account of the injuries and a consideration of remedies which it is expected will shortly be published by the Department of Agriculture.

Rhopalosiphum violæ, n. sp.

Apterous females dark cherry-brown and polished, the larvæ and pupæ generally somewhat paler. Eyes dark brown, third joint of antennæ more or less distinctly of a paler colour than the body, the remaining joints black. Legs purplish, the femora darkest towards the end and the apex of the tibiæ and the tarsi black. Nectaries purplish. Head and thorax of the pupæ generally paler than the rest of the body.

Winged females also dark cherry-brown or purplish-brown, the antennæ, thoracic lobes, terminal two-thirds or more of femora, apex of tibiæ and tarsi black; rest of the legs of a dull yellowish colour, with a tinge of purple. Nectaries and tail dusky. Wings clear, the veins strong and black and conspicuously shaded; stigma black; stigmal vein short

and strongly curved. Antennæ of all, very long and slender, reaching considerably beyond the end of the body; joint six with its spur is much longer than the third, joints four and five are subequal in length, and each of them somewhat longer than the third; there are numerous sensorial tubercles on joint three and a few on joint four, while all of them are sharply serrate. The first joint is very much the stoutest, and bulging out strongly about the middle at the inner side; frontal tubercles prominent and gibbous at the inner apical angle. Legs long and slender. Nectaries clavate, reaching to the tip of the abdomen. Tail short and inconspicuous. Length of winged and apterous females about 1.6 mm. expanse of wings about 5 mm.

Type No. 4467, U. S. National Museum. Many specimens. Type locality, Washington, D. C.

This is a singularly handsome species, which in the peculiarly short and strongly curved stigmal vein and strongly shaded venation reminds one of *Callipterus*; while the gibbous frontal tubercles recall those of some species of *Myzus*. There is also a queer tendency of losing one or both branches of the third discoidal vein, the stigmal and sometimes one or both of the veins of the hind wings. In one of the wings of one specimen the second and third discoidals arise from the same spot, while these two veins of the other wing arise from a common petiole.

These plant-lice are very numerous at the crown of violet plants, preventing the young leaves from unfolding or checking their development. Many are also found in the petioles and on the under side of the leaves.

ON TWO GENERA OF MITES.

BY NATHAN BANKS, EAST END, VA.

In 1871, Thorell published his description of *Rhagidia* in a paper entitled, "Om Arachnider fran Spetsbergen och Beeren-Eiland." He placed it in the family *Eupodidæ*, from the other genera of which it differed principally in the great size of the mandibles. In 1876, Cambridge, in his paper "On a new Order and some new Genera of Arachnida from Kerguelen's Land," described *Pacilophysis* as the type of a new family and a new order. He was unaware of Thorell's mite, yet there is but one prominent difference between them, *Pacilophysis* is said to have eyes on the frontal tubercle. Neither of these authors gave any reference to any species of Koch's genus *Scyphius*, to which their forms bear a great resemblance. Koch described about a dozen species of this

genus, many of which are doubtless only forms of one species. In the modern European literature, nothing is done with Koch's species of this genus, save by Oudemans (1897), who identifies four of the Kochian names. Oudemans, however, appears to be ignorant of the fact that there were several other names for this genus besides *Scyphius*, for he thinks, since *Scyphius* is preoccupied, that the genus must have a new name.

However, in 1886 it received two names, *Norneria* from Canestrini and *Scyphoides* from Berlese. The former has the priority, and is used by Berlese in his "Acari Italiani." Canestrini pleaded the impossibility of identifying Koch's species, and described both of the Italian forms as new, in which he has been followed by Berlese. Neither of the Italian authors appear to be aware of either *Rhagidia* or *Pæcilophysis*, else they would have mentioned the similarity between these forms; and Berlese omits these genera from his list, which professes to be complete for the world. There is not, however, any doubt that *Rhagidia* is generically the same as *Scyphius*, and *Rhagidia* has priority over all the other names proposed to replace *Scyphius* (which is preoccupied). *Pæcilophysis*, in spite of its alleged eyes, is not, in my opinion, distinct from *Rhagidia*. The *Scyphoides* of Karpelles (1891) is evidently a different genus, but somewhat allied to *Rhagidia*.

Rhagidia is thus a world-wide genus, known by the large mandibles and its resemblance to *Solfugidæ*, a fact noticed by both Thorell and Cambridge. The genus will stand as follows:

RHAGIDIA, Thorell, 1871.

Scyphius, Koch (preoccupied).

Pæcilophysis, Cambridge, 1876.

Norneria, Canestrini, 1886.

Scyphoides, Berlese, 1886.

It is impossible to tell how many of Koch's names represent good species; however, omitting these, there are the following species in the genus:

Rhagidia gelida, Thorell—Behring Island, Nova Zembla, Siberia.

" *kerquensis*, Cambr. (*Pæcilophysis*)—Kerguelen.

" *gigas*, Canestr. (*Norneria*)—Italy.

" *clavifrons*, Canestr. (*Norneria*)—Italy.

" *hamata*, Kr. and Neum. (*Scyphius*)—Japan.

" *japonica*, Kr. and Neum. (*Scyphius*)—Japan.

" *pallida*, Banks—United States.

* * * * *

In the Ann. Entom. Soc., France, for 1864, Lucas described, on page 206, a curious mite from Algeria and Tunis. He called it *Rhyncholophus* (?) *plumipes*. It differed from the ordinary species of this genus in a number of minor characters, but was chiefly remarkable in having on the hind tarsi a dense plume of long hair. Frauenfeld, in the Zool.-bot. Ges. Wien., XVIII., p. 892, records having received specimens from Spain and Corfu, which he considers this species. He does not give any description of his forms, so it is not possible to tell whether they were the same species or not. Then, Haller, in his paper—Beit. zur Kenntniss der schweizerischen Milbenfauna—gave a figure and description of a mite, which he considered Lucas's species, from specimens collected in Switzerland. There are, however, numerous differences between his form and that described by Lucas, so there is no doubt that the Swiss species is new. In 1893, Birula, in Horæ Soc. Entom. Ross, p. 388, under the heading of "*Rhyncholophus* (*Macropus*) *plumifer*," describes an allied mite. He gives no reference to Lucas, and probably did not know of *R. plumipes*. The subgeneric name, *Macropus*, is not mentioned in the text of the article. His species came from Russian Armenia. C. F. George, in Science Gossip, Vol. III., p. 150 (1896), records *R. plumipes* from the Isle of Jersey; it is not certain that it is the species of Lucas. Now, in 1897, Cambridge, in the Proc. Zool. Soc., London, p. 939, gives the description and figure of a new genus and species of mite from Algeria—*Eatonia scopulifera*. He refers to Birula's paper, but not to that of Lucas or Haller. A glance at his figures and description shows that it is the same as *Rhyncholophus plumipes*, without the shadow of a doubt.

Now the question arises, "What is the name of this mite?" All of these mites have the same peculiar structure of the hind tarsi, and undoubtedly form a natural group of generic rank. The first name proposed, *Macropus*, by Birula (which is not mentioned by Cambridge) has been used several times in Zoology, and so is not available. *Eatonia* has been used at least twice before, and also becomes inapplicable. It is therefore necessary to create a new name for the genus. I propose *Lucasiella*.

As to the species, Cambridge's species is the same as that of Lucas. Haller's form is not the same, and may be called *L. Halleri*. Birula's species is a good one, so that there are at least three species of this genus in the Mediterranean region, which may be tabulated as below :

1. Body granulate ; rostrum with a long spine ; palpi tapering, straight ; last joint of leg iv. not swollen.....*L. plumipes*.
Body with scales or flattened hairs.....2.
2. Frontal tubercle with short spines ; last joint of leg iv. swollen.....*L. plumifer*.
Frontal tubercle with very long spines ; last joint of leg iv. not swollen.....*L. Halleri*.

LUCASIELLA, Banks.

Rhyncholophus, Lucas (in part), 1864.

Macropus, Birula (preoccupied), 1893.

Eatonia, Cambridge (preoccupied), 1897.

L. plumipes, Lucas, 1864—Algeria, Tunis, Corfu, Spain, Isle of Jersey.

Eatonia scopulifera, Cambr., 1897.

L. plumifer, Birula, 1893—Russian Armenia.

L. Halleri, Banks, 1899—Switzerland.

R. plumipes, Haller (nec Lucas).

NEW GENERA AND SPECIES OF EPHYDRIDÆ.

BY D. W. COQUILLET, WASHINGTON, D. C.

Psilopa flavida, n. sp. ♂.—Yellow, polished, the third joint of antennæ, except the lower side, dark brown ; hairs and macrochætæ black, a vitta reaching from humerus to insertion of wing, and another on middle of pleura, black ; abdomen, except first segment and middle of the second, black, with a strong violaceous tinge ; knob of halteres greenish yellow ; wings grayish hyaline, unmarked ; two pairs of dorso-central macrochætæ ; length 2.5 mm. New Bedford, Mass. A single specimen collected by Dr. Garry de N. Hough. Type No. 4292, U. S. Nat. Museum.

Psilopa varipes, n. sp. ♀.—Black, polished, the third antennal joint brown, its base yellow, knob of halteres white, middle and hind tibiæ and their tarsi yellow, apices of the tarsi brown ; head, thorax and scutellum tinged with green, the mesonotum and scutellum slightly scabrous, less polished than the head and pleura, only one pair of dorso-centrals ; wings hyaline, the hind crossvein distinctly clouded with brown ; length 2 mm. Vancouver Isd., Brit. Columbia. Three specimens collected by Mr. C. Livingston. Type No. 4293, U. S. Nat. Museum.

Psilopa similis, n. sp. ♂ ♀.—Black, the third antennal joint brownish, knob of halteres white ; all coxæ, femora, middle and hind

tibiæ and their tarsi, yellow; head and pleura highly polished, the abdomen less so, mesonotum and scutellum subopaque, slightly scabrous, thinly gray, pruinose, one pair of dorso-centrals; wings hyaline, both cross veins clouded with brown, broad apex of wing also brown; length 2 mm. Biscayne Bay, Fla. (Mrs. A. T. Slosson), and Opelousas, La. (Mr. G. R. Pilate). Five specimens. Those from the last named locality are in the collection of Dr. Garry de N. Hough, to whom I am indebted for the privilege of examining these and other specimens belonging to this family. Type No. 4294, U. S. Nat. Museum.

Hyadina albovenosa, n. sp. ♀.—Black, the under portion of the third antennal joint, palpi, and tarsi except the last joint, yellow, the halteres whitish; face, cheeks and lower part of occiput opaque gray pruinose, remainder of occiput slightly polished, front highly polished, mesonotum and scutellum slightly less so, one pair of dorso-centrals, pleura thinly whitish pruinose, abdomen opaque brownish pruinose, the broad lateral margins and the fifth segment highly polished, genitalia light gray; wings grayish hyaline, the cross veins distinctly clouded with white. Length 1 mm. Tifton, Ga. (Oct., 1896), and Opelousas, La. (March, 1897). Three specimens collected by Mr. G. R. Pilate. Type No. 4295, U. S. Nat. Museum.

Gastrops nebulosus, n. sp. ♂ ♀.—Black, the antennæ, except the upper edge and sometimes broad apex of the third joint, apex of proboscis, stem of halteres, and tarsi, except the last joint, yellow; tibiæ reddish-brown; head, thorax and scutellum polished, sparsely covered with brownish pruinose spots, one pair of dorso-centrals; abdomen lustrous, tinged with bronze, coarsely punctured; wings hyaline, mottled with light and dark brown, a dark brown cloud on the cross veins, one below apex of the first vein, another midway between apices of first and second veins, one at apex of second vein covering a stump of a vein that projects into the submarginal cell from the second vein a short distance before its apex; apices of third and fourth veins bordered with brown, that on the third extending more than half way to apex of second vein, where it is considerably expanded; a faint brown cloud in the outer fourth of the first posterior cell, and one near centre of the second posterior cell; length 2 to 3 mm. N. C. and Tifton, Ga. (Oct.-Nov., 1896). Nine specimens; those from Ga. were collected by Mr. G. R. Pilate, and are in Dr. Hough's collection. Type No. 4296, U. S. Nat. Museum.

Nostima, n. gen. Hydrellinæ.—Second joint of antennæ destitute of bristles, arista with long pectinations on the upper side; two pairs of vertical bristles, a strong pair of ocellars, situated between the two upper ocelli, three pairs of extremely small fronto-orbitals forming a row along each eye; face strongly projecting forward below, in profile slightly concave to the lowest seventh, then strongly retreating to the oral margin, three bristles near each lower corner of the face; eyes densely pubescent. Thorax bearing two pairs of dorso-centrals, no bristly hairs between them, only a few on any portion of the thorax; two notopleural and a small sternopleural macrochætæ, two pairs on the scutellum. Abdomen composed of five segments, of which the second is as long as the three following taken together, the latter subequal in length. Legs destitute of long bristles. Venation normal, the costa is continued to the tip of the fourth vein, apex of second vein slightly nearer tip of the third than to the first, last two sections of fourth vein subequal in length. Type, the following species:

Nostima Slossonæ, n. sp. ♀.—Black, opaque, the legs polished, the under side of the third antennal joint, the tarsi except the last joint, and a band near the middle of each hind tibia, yellow; face gray pruinose, a small brown spot near the centre, front blackish brown, an ocellar dot, the upper corners and narrow orbits, gray; mesonotum gray pruinose, marked with five dark brown vittæ, pleura black, a gray streak near the middle of the front part, and another on the upper edge of the sternopleura; scutellum black, the front corners gray, metanotum and abdomen black, a pair of gray spots on the third, fourth and fifth segments; wings dark brown, the costal cell and the marginal cell adjoining it almost wholly white, a white spot covering a stump of a vein nearly midway between apices of first and second veins, a similar spot before, and another at the apex of the second vein, one near the apex of the submarginal cell, another in the first posterior cell slightly more remote from its apex than the above, one on the fourth vein opposite the one in the first posterior cell, one near the apex of the discal cell, and one on the opposite side of the fifth vein; a white spot on the small cross vein, one at each end of the hind cross vein, a nearly triangular spot in extreme apex of the first posterior cell, and a large one at the first third of this cell, a narrow one on the opposite side of the third vein, a whitish streak near base of discal cell, and another near centre of the third posterior cell; length nearly 1 mm. Biscayne Bay, Florida. A single specimen collected by Mrs. Annie T. Slosson, to whom this handsome species is respectfully dedicated. Type No. 4297, U. S. Nat. Museum.

Paratissa, n. gen. Notiphilinæ.—Second joint of antennæ covered with very short, stout bristles, and with a longer one, directed forward, at the upper angle of the inner side, arista with long pectinations on the upper side; two pairs of vertical bristles, an ocellar pair situated slightly lower than the two upper ocelli, a second pair placed a little lower than the lowest ocellus, also a third pair nearly midway between these and the lower edge of the front, the three pairs directed forward; four pairs of fronto orbitals, placed in a row along each eye, the upper pair the smallest, the two upper pairs directed outward, the others forward; face slightly projecting forward at the oral margin, in profile gently concave, bearing two macrochætæ near each lower corner, several stout bristles along the lateral oral margin, cheeks scarcely one-seventh as broad as height of eyes. Thorax bearing two pairs of dorso-centrals, one intra-alar, three supra-alar, one præsutural, one humeral, two notopleural, two mesopleural and one sternopleural macrochætæ; short, bristly hairs of mesonotum numerous and arranged in quite regular rows, two of which are between the dorso-centrals; scutellum covered with short, bristly hairs and bearing three pairs of macrochætæ, the intermediate pair less than half as long as the anterior pair. Abdomen composed of five segments in the male, six in the female. Tibiæ destitute of long bristles. Venation normal, costa reaching apex of fourth vein, apex of second vein slightly beyond middle between first and third veins, penultimate section of fourth vein two-thirds as long as the last section. Type *Drosophila pollinosa*, Williston, from St. Vincent, West Indies; three specimens were taken by Mrs. A. T. Slosson, at Biscayne Bay, Florida.

Ephydra austrina, n. sp. ♂ ♀.—Front in the middle polished bronze green, very thinly brownish pruinose, sparsely covered with short bristly hairs and with a pair of stout macrochætæ a short distance above the antennæ; an oval depression below the lowest ocellus, sides of front opaque brown pruinose, the narrow orbits gray, two fronto-orbitals each side; face near the upper edge green, polished, thinly grayish pruinose, remainder of face opaque brownish gray pruinose, the macrochætæ fringing the anterior oral margin few and rather short; antennæ black, the third joint destitute of a long lateral hair; proboscis grayish black, the apex yellowish, palpi brown; body green, mesonotum polished, thinly brown pruinose, five pairs of dorso-centrals, pleura greenish gray pruinose, a brown spot near the centre; abdomen subopaque, thinly gray pruinose; second, third and fourth segments in the male subequal in length, each slightly shorter than the fifth; femora green, tibiæ greenish brown, all thinly gray pruinose, knees yellowish, tarsi brown, not enlarged in either sex; wings hyaline; halteres yellow; length 4 to 5.5 mm. Georgiana, Florida. Nine specimens, collected by Mr. William Wittfeld. Type No. 4299, U. S. Nat. Museum.

NOTES ON SOME NORTH AMERICAN YPONOMEUTIDÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Family YPONOMEUTIDÆ.

Synopsis of North American Genera.

Hind wings with veins 3 and 4 stalked or united.

Hind wings with vein 4 present.

Veins 6 and 7 separate.

Antennæ of male thickened with scales toward

base.....*Walsinghamia*.

Antennæ of male not thickened with scales.

Second joint of palpi tufted.....*Choreutis*.

Second joint not tufted, but rough scaled.

Hind wings elongate ovate or narrow ob-

long.....*Glyphipteryx*.Hind wings short ovate or trigonate...*Simathis*.Veins 6 and 7 stalked.....*Setiostoma*.Hind wings with vein 4 absent.....*Yponomeuta*.

Hind wings with veins 3 and 4 separate, rarely connate.

Palpi not tufted, smooth, upturned.

Hind wings with the cross-vein of cell strongly angled..*Mieza*.

Hind wings with the cross-vein straight.

Palpi reaching above the middle of the front.....*Atteva*.Palpi not reaching the middle of the front..*Trichostibas*.

Palpi with the second joint tufted below or porrect and hairy.

Third joint smooth, sharp pointed, distinct.

Veins 6 and 7 of hind wings stalked.

Veins 7 and 8 of fore wings stalked.

Apex of fore wings pointed.....*Cerostoma*.Apex of fore wings falcate.....*Periclymenobius*.Veins 7 and 8 of fore wings separate.....*Trachoma*.

Veins 6 and 7 of hind wings separate.

Veins 7 and 8 of fore wings separate.....*Plutella*.Veins 7 and 8 of fore wings stalked.....*Eido*.

Third joint concealed in hair or porrect, not smooth.

Veins 6 and 7 of hind wings stalked.....*Eucratia*.

Veins 6 and 7 of hind wings separate.

Fore wings with 11 veins.....*Pterolonche*.

Fore wings with 12 veins.

Veins 9 and 10 stalked *Calantica*.

Veins 9 and 10 separate.

Basal joint of palpi short *Aræolepia*.

Basal joint of palpi long ? *Thelethia*.

Subfamily YPONOMEUTINÆ.

Genus YPONOMEUTA, Latr.

Latr., Gen. Crust. Ins., IV., 222, 1796; *Hyponomeuta*, Sdt., et auct.

Synopsis of Species.

Hind wings above and all wings below shaded with dark gray *multipunctella*.

Wings white on both sides *orbimaculella*.

Y. multipunctella, Clem., Pr. Acad. Nat. Sci. Phil., 8, 1860; Chamb. Bull. U. S. Geog. Surv., IV., 151, 1878 (refs.); Riley, Smith's List. Lep. Bor. Am., No. 5156; *wakarusa*, Gaumer, Obs. Nat.; Chamb. Bull. IV., 151, 1878; ♂ *ordinatellus*, Walk., Cat. Brit. Mus., XXVIII., 530, 1863.

A specimen of this species in the Nat. Museum has pinned on it a printed slip, cut from a journal, which reads as follows: "On the 25th of May, I obtained from the Wakarusa bottom a large number of very small larvæ that were feeding upon the Waahoo, *Euonymus atropurpureus*. These caterpillars were so small when fully grown that they escaped through the wire-topped cage and made their cocoons in the corners of the room, and, ten days later, they hatched and were captured as they flew in the windows. This is the moth which I have named the Waahoo moth, *Hyponomeuta wakarusa*." Across the face of the slip is written "G. F. Gaumer."

I have nine males, no females, of *multipunctella*.

Y. orbimaculella, Chamb., CAN. ENT., V., 12, 1873; *orbimaculella*, Riley, Smith's List Lep. Bor. Am., No. 5157, 1891; *euonymella*, Chamb., CAN. ENT., IV., 42, 1872; *evonymella*, Chamb., Bull. U. S. Geog. Surv., IV., 150, 1878; ♀ *ordinatellus*, Walk.

This differs from the preceding only in lacking the gray shading. I have seven females, no males, of *orbimaculella*. Both forms, bred from *Euonymus americanus*, Dept. Agriculture, No. 3406, will doubtless prove to be sexes of one species as determined by Walker.

[NOTE.—*Y. apicipunctella*, Chamb., and *Y. Zelleriella*, Chamb., are referable to *Psecadia* in the *Ecophoridae*; *Y. quinquepunctella*, Chamb., to *Prodoxus* in the *Tineidae*.]

Genus MIEZA, Walk.

Walk., Cat. Brit. Mus., II., 527, 1854; *Encemia*, Zell., Verh. Zool.-Bot. Ges. Wien., XXII., 562, 1872; XXV., 345, 1875.

Synopsis of Species.

Head white on the vertex.

Fore wings white on basal two-thirds of inner margin, with distinct, round, dark brown spots *subfervens*.

Fore wings thickly and uniformly sprinkled with brown streaks, the round dots small and obscure *psammitis*.

Head red on vertex *igninix*.

M. subfervens, Walk., Cat. Brit. Mus., II., 528, 1854; Zell., Verh. Zool.-Bot. Ges. Wien., XXII., 563, 1872; Grote, Bull. Buff. Soc., II., 152, 1874.

M. psammitis, Zell., Verh. Zool.-Bot. Ges. Wien., XXII., 562, 1872.

M. igninix, Walk., Cat. Brit. Mus., II., 527, 1854; Grote, Bull. Buff. Soc., II., 152, 1874; *crassinervella*, Zell., Verh. Zool.-Bot. Ges. Wien., XXII., 563, 1872; Packard, Amer. Nat., IV., 229, 1870, pl. 2, fig. 1 (as *Eustixia pupula*); Slosson, Journ. N. Y. Ent. Soc., IV., 86, 1896; Dyar, Journ. N. Y. Ent. Soc., IV., 87, 1896.

Genus ATTEVA, Walk.

Walk., Cat. Brit. Mus., II., 526, 1854; Wals., Proc. Zool. Soc. Lond., 1897, 112 (full refs. and synon.).

A. aurea, Fitch, 3rd. Rept. Ins. N. Y., 168, 1856; Pack., Proc. Ent. Soc. Phil., III., 106, 1864; Stretch, Zyg. Bomb. N. A., 159, 1872; *compta*, Clem., Proc. Acad. Nat. Sci. Phil., 251, 1862; Grote, Proc. Ent. Soc. Phil., IV., 319, 1865; V., 231, 1865; Riley, 1st Rept. Ins. Mo., 151, 1868; Zell., Stett. Ent. Zeit., XXXII., 178, 1871; Wals., Proc. Zool. Soc. Lond., 1897, 112.

The larva feeds on *Ailanthus*.

Lord Walsingham refers *punctella*, *aurea* and *gemmata* to one species, but they certainly seem distinct.

A. gemmata, Grote, Bull. Buff. Soc., I., 93, 1873; Wals., Proc. Zool. Soc. Lond., 1897, 113; *floridana*, Neum., CAN. ENT., XXIII., 123, 1891; Dyar, Journ. N. Y. Ent. Soc., V., 48, 1897.

The larva feeds on *Simaruba*.

Genus TRICHOSTIBAS, Zell.

Zell., Stett. Ent. Zeit., 1863, 150; Hor. Ent. Soc. Ross., XIII., 227, 1877; Wals., Proc. Zool. Soc. Lond., 1897, 114.

T. calligera, Zell., Hor. Ent. Soc. Ross., XIII., 231, 1877; Wals., Proc. Zool. Soc. Lond., 1891, 533, 547; 1897, 115; *parvula*, Hy. Edw., Pap. I., 80, 1881; Smith's List, Lep. Bor. Am., No. 958, 1891; Kirby, Cat. Lep. Het., I., 86, 1892; Dyar, Journ. N. Y. Ent. Soc., VI., 41, 1898.

Not uncommon in southern Florida. The Nat. Museum has some 25 of the cocoons, which closely resemble Lord Walsingham's description of *T. fumosa*, Zell. (Proc. Zool. Soc., Lond., 1897, 114), except that it is not kidney-shaped, but regularly elliptical. The meshes are nearly square, and the stem by which it is suspended runs along the side of the cocoon and projects a little way beyond. The open neck at the posterior end, about the use of which Lord Walsingham seems to have been in doubt, obviously serves as a place to eject the larval cast skin, which has disappeared in all the specimens before me. I found the cocoons on the trunk of a large tree at Miami, Florida. Other specimens are labelled "on fence," Green Cove Springs, Fla. (R. S. Turner); "on Persea, sp.," Cocconut Grove, Fla. (E. A. Schwarz); Jacksonville, Fla. (W. H. Ashmead).

Subfamily PLUTELLINÆ.

This includes *Calantica*, Zell.; *Euceratia*, Wals.; *Aræolepia*, Wals.; *Periclymenobius*, Wall.; *Trachoma*, Wall.; *Pterolonche*, Zell.; *Cerostoma*, Latr.; *Plutella*, Schr. Eido, Chamb., seems also to fall here, though I have no specimens.

These genera stand correctly listed in Smith's list, except that *dubiosella*, Beut. (No. 5198), should be transferred to *Plutella*, and is, indeed, scarcely to be distinguished from the less strongly marked specimens of *P. cruciferarum*, which are in the collection, bred from turnip. This latter species should be known as *P. maculipennis*, Curt. (see Wals. and Durr., Ent. Mo. Mag., XXXIII, 173, 1897, for full references).

The following species may be added:

Cerostoma Koebelella, n. sp.

Maxillary palpi filiform, labial long, second joint strongly tufted below, third smooth, sharp pointed. On fore wings veins 7 and 8 stalked; on hind wings 3 and 4 approximate, but separate, 6 and 7 long stalked. Head and thorax dark gray; fore wings purplish gray on the half towards inner margin, sprinkled with little irregular clusters of brown-black scales; costal half paler, likewise irrorate with darker scales, a luteous band from the middle of the cell to apex, ill-defined and diffuse, irrorate with brown

scales. It is of even width, covering veins 7 and 8; beyond the cell are also two faint luteous streaks over veins 5 and 6. Secondaries and abdomen shining gray. Expanse 18 mm., one male, Placer Co., Cal., Sept., "through C. V. Riley," U. S. Nat. Museum, type No. 4422.

Synopsis of Species of Cerostoma.

Fore wing luteous, this colour predominating.

Smooth, reddish luteous, not irrorate.....*sublucella*, Wals.

Wings irrorate with darker lines and spots.

A dark streak from apex to cell; two black blotches on inner margin, the wing otherwise scarcely strigose.....*cervella*, Wals.

No apical streak: fore wing strigose-reticulate, some of the strigæ on internal margin often forming heavy dots.....*subsylvella*, Wals.

Fore wing gray, the luteous not predominating.

A series of three black dashes below the cell and a spot at the end.....*alutianella*, Beut.

No longitudinal black dashes.

A luteous streak from cell to apex.....*Koebelella*, Dyar.

No such streak, at most a luteous ray from the base toward outer margin.....*radiatella*, Don.

Subfamily GLYPHIPTERYGINÆ

Genus SETIOSTOMA, Zell.

Zell., Verh. Zool.-Bot. Ges. Wien., XXV., 324, 1875.

S. xanthobasis, Zell., Verh. Zool.-Bot. Ges. Wien., XXV., 325, 1875.

S. Fernaldella, Riley, Proc. Ent. Soc., Wash., I., 155, 1889.

Genus WALSINGHAMIA, Riley.

Riley, Proc. Ent. Soc., Wash., I, 157, 1889.

W. diva, Riley, Proc. Ent. Soc., Wash., I., 158, 1889.

Genus SIMÆTHIS, Leach.

Leach, in Sam. Comp., 254, 1819; *Brenthia*, Clem., Proc. Acad. Nat. Sci., Phil., 1860, 172.

S. vicarilis, Zell., Verh., Zool.-Bot. Ges., Wien., XXV., 322, 1875.

S. pavonacella, Clem., Proc. Acad. Nat. Sci., XII., 172, 1860; Wals., Proc. Zool. Soc., Lond., 1897, 120 (references).

Lord Walsingham recognizes the genus *Brenthia* for this species, but it seems to me to fall in *Simæthis*. The other species of *Brenthia* fall in *Choreutis*.

(To be continued.)

NEW SPECIES AND VARIETIES OF NORTH AMERICAN LEPIDOPTERA.

BY WILLIAM BARNES, M. D., DECATUR, ILLINOIS.

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| <i>Melitæa Chalcedon</i> , ab. <i>fusimacula</i> . | <i>Seirarctia Clio</i> , var. <i>Jessica</i> , n. var. |
| <i>Melitæa Chalcedon</i> , ab. <i>Mariana</i> . | <i>Orgyia Oslari</i> , n. sp. |
| <i>Melitæa Senrabii</i> , n. sp. | <i>Eulimacodes Telligii</i> , n. sp. |
| <i>Thecla Mirabelle</i> , n. sp. | <i>Coloradia Doris</i> , n. sp. |
| <i>Pyrgus Polingii</i> , n. sp. | <i>Tolype Glenwoodii</i> , n. sp. |
| <i>Pseudalypia Geronimo</i> , n. sp. | <i>Gloveria Arizonensis</i> , Pack., male. |

Melitæa Chalcedon, ab. *fusimacula*.—Variations of *Chalcedon* are very common, but the ones I now describe are so striking that they are certainly worthy of a varietal name, especially as they do not seem to be so very uncommon. In the first of these, to which I have given the name *Fusimacula*, there is a tendency to obliteration of the spots on discs of both wings, and to a fusion of the three outer rows of spots in a horizontal direction. The ground colour of the upper surface is of the same rich black as *Chalcedon*. There is a complete absence of the spots in the cells of both fore and hind wings in males, and there are but faint traces of them in the females. On the fore wings the fusion takes place as follows: The two outer rows unite to form a yellow band, which is joined at about its middle by a yellow demi-band from the costa, which is composed of the fusion of the two inner rows. The infra-cellular spot on the fore wings is either absent or fused with the large spot outside of it, thus forming a large quadrangular patch on the middle of the hind margin. On the hind wings there is more or less complete fusion of the outer three rows of spots, resulting in a broad yellow band across the wing composed of large quadrangular spots three-eighths of an inch long lying between the nervules. There are faint traces of a marginal row of red spots. On the under side the fusion is even more marked. There is almost complete obliteration of the mesial row of red spots on the hind wings. The red markings on the inner third of the hind wings are about the same as in *Chalcedon*, but the yellow spots have almost or quite disappeared, being replaced by black. Types: three males and two females from California.

Melitæa Chalcedon, ab. *Mariana*.—Upper surface black on both wings, the only markings being, on the fore wings the marginal row of red spots, and in one specimen two faint red spots in cell, and on the hind wings a series of minute yellow spots, representing the mesial row. All

the other spots have disappeared, though in one specimen a few can be discerned through the black. On the under surface the yellow markings have been entirely replaced by black, the red remaining intact. In one specimen the yellow spots can be traced through the black, but in the other there is no sign of them to be seen. The only traces of yellow are a few scales along the veins of the hind wings, a few more at the apex of the fore wings and the spots on the fringes. Types: two males. California.

Melitæa Senrabii, n. sp.—Male, upper surface black, with light brick-red markings as follows: Indications of a marginal row of spots as shown by two or three at inner angle of fore wings. In one specimen there are also faint traces of spots on the secondaries. A submarginal row following outer edge of both wings, seven on fore and eight on hind wings, large and distinct. A third row nearly obsolete. The three spots at costal end, yellowish white. Two narrow bars in cell and four or five small irregular spots below and to inner side of them, on the primaries. On inner half of hind wings, two short transverse bars from costal edge with a round spot below and between them. Traces of one or two other spots. Under surface of primaries has a marginal band of red divided by black veins. Within this is a row of white spots, fading out at inner angle, heavily margined by black internally, and lightly externally. The third row is composed of large red spots corresponding to the prominent row on the upper surface. A demi-band from costa joins this at its middle. The spots on the demi-band are four or five in number and of a yellowish tinge. The remainder of the wing is red, and has four black bands from costa; the inner extending across wing, the outer three only half way. Hind wings have a marginal, a basal and a double mesial row of white spots margined with black. There is also a white spot in disc, margined with black. The rest of the wing is red. Thorax and abdomen, black above, whitish beneath. Antennæ black with light rings at joints. Expanse, male, seven-eighths inch. Types: two males. Corpus Christi, Texas.

Thecla Mirabelle, n. sp.—Compared to *Autolytus*, Edw., to which it is closely allied, and of which it may prove a variety, the apex of fore wings is more acute and the inner angle more retracted, and the discal mark is broader. The fulvous patch is not so sharply defined and more rounded. The anal angle of the hind wings is much more acute and the outer margin not so rounded. There is almost no trace of the tooth

marking the position of the upper tail. The fulvous patch extends inward towards the base of the wing instead of following the outer margin, and merges gradually into the ground colour of the wing, which is not so dark as in *Autolycus*, being more of a yellowish brown. Under side more of a light yellowish brown than fawn colour. The marginal row of crescents is wanting, and the discal macular row of spots is very indistinct. The black spots at anal angle faint. Fulvous lunules obsolete, except one in third space from anal angle and a few scales in the fourth space. Blue patch in third space, though faint. Types: one male from Utah and one female with California label, for the accuracy of which, however, I cannot vouch, as I received it from a dealer. I am inclined to regard this as a desert form of *Autolycus*, but until its position can be settled by more material, it may be regarded as distinct.

Pyrus Polingii, n. sp.—Expanse, one inch. Upper surface brownish black. Fringes fuscous. Marked with small white dots as follows: Three subapical, close together in a row from costa, the middle one minute, one in cell, three in a longitudinal row below cell, the middle one largest, separated about one-sixteenth of an inch from inner margin, one faint, one close to inner margin a little beyond middle. On secondaries is a mesial curved row of three or four parallel to margin. Under surface disc of primaries blackish brown, costa and outer fourth considerably lighter, more of a yellowish brown, inner margin grayish. Inner two-thirds of secondaries dark brown, outer third yellowish brown. Spots on under surface as above, only larger, and an additional spot in cell on secondaries. Head, thorax and abdomen blackish brown above, fuscous beneath. Antennæ blackish above, joints narrowly yellowish white, tip yellowish brown, beneath tip and base of club brownish, medium portion yellowish, shaft brown ringed with yellow. Types: four males, four females. Huachuca Mountains, Arizona. July.

Pseudalyptia Geronimo, n. sp.—Upper surface black with a slight brownish reflection which is more marked on secondaries. Fringes a shade lighter. Secondaries without markings. Two large quadrangular light yellow spots on primaries, forming a band across wing from costal edge at junction of middle and outer thirds to inner angle. To the inner side of the costal spot is a narrow band of bluish metallic scales. With a lens the brownish lustre to the wings is shown to be due to a sprinkling of bronze metallic scales over the black ground colour. In one specimen there are a few yellowish scales in the region of the discal dot, and a few

bluish scales along some of the veins. Probably in fresher specimens these would be more marked. Under surface lacks the bluish markings, otherwise as above. Head, thorax, and abdomen black above and below, showing, however, with lens some metallic effects. Legs black; but hairs on inner aspect, especially on posterior pair, orange. Palpi dark above, fuscous beneath. Tongue yellow. Antennæ black, tending to fuscous at tip and on under side. Eyes show bright metallic, brassy shades. There is a tuft of bright orange hairs at base of primaries on under side. Expanse, one and one-half inches. Types: four males and one female. Huachuca Mountains, Arizona. July and August.

Seiraretia Clio, var. *Jessica*. n. var.—Differs from type form in having hind wings almost or entirely black. In the males the suffusion of the hind wings with black is complete, while in the females it is only partially so, there remaining small patches of the white, especially along outer margin and costa. The veins of fore wings are also much more heavily lined with black. There is a well-marked black edging to the inner, outer and costal margins of fore wings of the males as well as the outer margin of secondaries of both sexes. In one female the outer margin of primaries also has the black edging. The under surface of primaries in the males is almost entirely suffused with black, while the secondaries as on the upper surface are entirely so. In the females this suffusion is much less marked. I have only seen this variety from Glenwood Springs, Colorado. The typical *Clio* I have from Salida and Durango, Colorado, and Nogales, Arizona.

Orgyia Oslari, n. sp.—Male expanse, one and one-sixteenth inches. Fore wings light yellowish brown. The ground colour is, however, largely covered over with a darker brown shade. Basal line black, distinct. T. a. line curved evenly outward from costa to middle of wing, then inward to inner margin where it approaches close to t. p. line, black, distinct; outer margin a little undulate, inner accompanied by a blackish shade, which quite fills the concavity of the curve at the costal end. T. p. line crenulate, black, distinct; beginning at costa, it extends downward and outward in a straight line to the third nervule, opposite reniform spot, where, forming an obtuse angle, it proceeds in a gentle curve around the cell and then inward to inner margin. It is accompanied by a blackish shade on the inner side of costal half. The limbal space is obscured in its outer or marginal half by a brownish shade, and has three small intervenular black dashes opposite cell. There is also a

black blotch on costa, just above the angle of the t. p. line, and a white spot above inner angle. The costa of the limbal region is darker than elsewhere. Reniform concolorous, surrounded by ring of blackish scales. Orbicular obscured by the shade accompanying t. a. line. Hind wings blackish brown, same as the darker shades of fore wings. Fringes concolorous. Under surface of both wings have a marginal band about one-eighth of an inch wide, of a light yellowish brown. The remainder of wings to the base of a dark blackish brown. Antennæ and thorax light brown. Abdomen a little darker. Types: one male. Poncha Springs, Colorado. July 5th.

Eulimacodes Telligii, n. sp.—Fore wings marked by a conspicuous triangular silver patch. The base of this is about one-sixteenth of an inch above the inner margin and extends with a very slight downward tendency from the middle of the base of wing to above the inner angle. The silver here gradually fades out, but the continuation of the line in a broad, easy curve to the apex is marked by some blackish scales. The upper edge of the patch ascends steeply from the middle of base of wing to near costal margin at its inner fourth, thence rounding off the apex of the triangle it descends in a rather steep curve and joins the base line above the inner angle. The wing above the silver mark, and its continuation, is of a rich golden brown, smooth and glistening, a little darker on disc and next to the silver patch. The rest of the wing below and to the outer side of the mark, together with the whole of the secondaries, is of a dull brown, a couple of shades lighter than the fore wings. Fringes, thorax and abdomen concolorous with hind wings. Under surface of both wings of a uniform light brown of same shade as secondaries above. Type: one female. Huachuca Mountains, Arizona. July 20th.

Coloradia Doris, n. sp.—Male expanse, two and one-fourth inches. Compared to Pandora, the wings are much less heavily scaled, the hind wings being quite translucent. The markings of primaries are much fainter and there is much less of the white shading. The t. a. line presents quite an even outward curve not approaching the discal spot. In Pandora this line is very prominently toothed and in some of the specimens one of the teeth extends to and is more or less completely fused with the spot. T. p. line evenly dentate, closer to margin of wing than in Pandora. S. t. line very faintly indicated. Hind wings translucent, almost no trace of the median and submarginal bands. Inner margin covered with long pinkish hairs as in Pandora. Fringes of both

wings black. The white spots at ends of veins faint. Discal spots oblong instead of round; not so prominent as in Pandora. Under side very thinly scaled. Markings as above, only very faint.

Female expanse, two and five-eighths inches. Dull, smoky brown, dusted with white between t. p. and t. a. lines on primaries, otherwise very uniform over both wings. Lines as in male, but still fainter. Under side same colour, somewhat pinkish at bases of wings. T. p. line very faintly indicated; otherwise, except the discal spots, there are no markings. Types: two males, one female, in my collection from Salida and Glenwood Springs, Colorado.

Tolyte Glenwoodii, n. sp.—That there are two species confused under the name of *Distincta*, French, I have been convinced for a long time. On showing them to Prof. French recently, when he was visiting me, he was very positive as regards their distinctness. Prof. Dyar, to whom I sent a pair of each for an opinion, regards them as mere varieties, on the grounds that he finds no constant marks of distinction between them. I have before me a series of eight pairs of *Distincta* and eight males and two females of *Glenwoodii*, and while constant differences in maculation of the two are rather hard to describe, yet there are points which seem to me to prove their distinctness beyond a doubt. *Glenwoodii* is a much broader-winged insect, by measurement the fore wings of the female being one-sixteenth of an inch broader than the females of *Distincta*. The thorax is apparently much larger. This is partially at least due to the greater development of the hairy vestiture. In the two females before me the abdomen does not protrude beyond the wings, while in all the female *Distinctas* it does to the extent of from one-eighth to one-fourth inch. The whole insect is heavier and more robust, shorter, broader winged, while *Distincta* is slighter and more trimly built, with rather long, narrow wings. In colour the *Distinctas* are all decidedly gray, in only two females does there seem to be a tendency to white on the thorax. The *Glenwoodiis* are all of a very light gray, almost pure white on the thorax. The hind wings are quite distinct in the two species. In the new one they present a well-marked, banded appearance, the bands being distinct and quite sharply defined. The marginal band is light and narrow. The submarginal quite dark and broad. The mesial band is of about the same width, and light. Within this the wing is dark, but lightens somewhat towards base. In *Distincta* these bands merge gradually into each other, there being much less

contrast in the two shades. The general effect is blurred and indistinct. On the fore wings, while there are no marked differences in the transverse lines, yet in *Distincta* they seem narrower, neater, and give a more trim, clear-cut appearance to the wings. The two teeth in the middle of the marginal white line are much more distinct in the old species, they being scarcely discernible in some of the specimens of the new. The t. a. line in *Distincta* proceeds directly to costa, while in the new species it turns inward just below costa and joins it at an acute angle. In other respects the maculation is practically the same. The examples on which the above comparative description is based were taken at Glenwood Springs, Colorado, in August, September, and October. Types in my collection, and also in National Museum.

Gloveria Arizonensis, Pack. Male.—Females of this species are quite common, coming freely to light. The male, however, has never been described, and so far as I know the two before me are the only ones ever taken. They differ so much from the females that I have made the following description of them: Expanse, two and three-fourths inches, thus being considerably smaller than the females, which average three and one-half inches. Maculation brighter and more distinct than in female; the contrasting light and dark blackish gray shades bringing out the transverse lines in strong relief. Basal space light gray, central portion obscured by a dark shade. Median space mostly dark, only the costa and infra-cellular parts being somewhat lighter. T. p. line accompanied by an outer shade, slightly separated from it by a light gray band. The remainder of the subterminal space is the lightest portion of the wing and is thinly scaled and quite translucent. Terminal space even dark gray, sharply defined by the prominent s. t. line and strongly contrasting with the subterminal space. Discal dot white, distinct. Hind wings ochraceous, costal and outer margins obscured by dusky shade. Veins of both wings dark gray. Fringe of hind wings fuscous, of fore wings concolorous. Head and abdomen ochraceous. Thorax dark gray anteriorly, shading into ochraceous posteriorly. Antennæ dark brown. Beneath; hind wings as above. Fore wings, cellular region and along costa to apex, as well as terminal area, dark; the rest of the wing light semi-translucent. Types: two specimens from Glenwood Springs, Colorado; taken in July and August.

FOUR NEW SPECIES OF PLATYMETOPIUS.

BY C. F. BAKER, ST. LOUIS, MO.

Platymetopius ornatus, n. sp.

Length, ♂, 5.25 mm., of which the head occupies 1 mm.; width across base of elytra a little more than 1 mm. Vertex rather strongly obtusely angulate; width between eyes three-fourths the length at middle, which is more than twice length at eyes; the disc is evenly slightly convex. Face, viewed from the side, straight. Pronotal width two and a half times the length; the length little more than three-eighths that of vertex. Pronotum about as broad as head, the anterior margin an even curve.

Colour pale yellowish; below brighter and unicolorous, except for a few dark arcs on summit of front. Vertex with a double dark spot at tip and three abbreviated dark transverse bands crossing the median line at equal intervals back of it. Pronotum with two abbreviated transverse lines anteriorly, and several irregular dark markings laterally. Scutellum with the transverse impressed line black and having each end connected with the base by a black band. Elytra smoky, back of the transverse veins with many small white spots, and three larger ones on the costa in the vicinity of the recurved costal nervures; membrane clear smoky. Valve not exerted, plates small, broad at base, suddenly narrowed beyond middle into slender acute points.

Described from one male in the National Museum; taken at Horace, Kansas, July 28, 1891.

Platymetopius Oregonensis, n. sp.

Length, ♂, 5 mm. Head rather short and distinctly narrower than pronotum. Vertex rather acutely angulate; width between eyes two-thirds the length at middle, which is about twice the length at eyes; disc broadly subsulcate medially. Face, viewed from side, nearly straight, very slightly concave above. Width of pronotum two and one-third times the length, the latter five-sevenths that of vertex; the anterior margin of pronotum recurved behind eyes.

Colour ferruginous, paler below, where there are no dark markings except a few faint arcs on summit of front. Vertex with a small light dash at apex; its disc, together with the pronotum and elytra, minutely irrorate. Elytra with a few small round white or hyaline spots scattered over the surface; partially transparent along costa and around apex; one or more of the inner apical veins dark. Valve very large and bluntly

triangular. Plates twice the length of valve, tapering to narrow points, the sides incurved at middle.

Described from two males, one collected at Ashland, Ore., the other at Portland, Ore., both during September, 1897, by Prof. A. P. Morse. Near *acutus*, but the vertex is shorter, the pronotum without light vittae, the elytra with fewer white spots, and colour beneath much lighter.

Platymetopius tenuifrons, n. sp.

Length, ♂, 5.5 mm. Head long, unusually narrowed beyond the eyes, and distinctly narrower than pronotum. Vertex strongly produced, suddenly narrowed beyond eyes, point blunt; width between eyes about half length at middle; disc broadly medially sulcate. Face, viewed from side, strongly concave above. Pronotal width two and one-fourth times the length, the latter less than two-thirds that of the vertex. Anterior margin of pronotum recurved behind eyes.

Colour ferruginous, thickly and very finely irrorate throughout, including the face, which is darkened towards its summit. Point of vertex with a black dot on either side of tip. Scutel with a faint white longitudinal line on either side. Elytra with one or two small round white spots in each of the cells back of apical; the apical veins and about twelve recurved nervures darkened. Valve large, broadly rounded behind. Plates short, about as long as valve, and rapidly narrowed to acute points.

Described from one male in the Herbert H. Smith collection, taken at Chapada, Brazil, in May. Resembles *fuscifrons* in the deeply coloured face, but is much larger and with a far longer vertex, besides differing otherwise.

Platymetopius latus, n. sp.

Length, ♀, 5 mm. Vertex very long, as long as twice the width between eyes, the median sulcus becoming very broad towards tip.

Colour clear pale ferruginous, below with the entire face paler. Sulcus on vertex darkened by fine longitudinal vermiculations. Pronotum, scutel and most of elytra unicolorous, without markings of any sort, except a few fine brown dots in internal apical cells of elytra, and about eight small recurved brown dashes along costa. Legs entirely without markings. Last ventral segment twice length of preceding, the hind margin rather narrowly, but evenly, rounded.

Described from a single female collected by myself in the foothills near Fort Collins, Colorado. This species is nearest *acutus*, but has a much longer vertex, entirely lacks any markings on pronotum or disc of elytra, and has the elytra more widely flaring at the sides than in that species.

THE PURSLANE SAW-FLY--SCHIZOCERUS ZABRISKEL,
ASHM., MS.*

BY F. M. WEBSTER AND C. W. MALLY, WOOSTER, OHIO.

Just when this species first became abundant in Ohio we are unable to say, but it was not until June, 1898, that we began a study of its habits. The insect is quite generally distributed in Ohio, as we have observed it at Alliance, Wooster, Tiffin, Fremont, and Clyde, and perhaps over the eastern and western parts of the United States, as it is found at Washington, D. C., where Dr. Chittenden is making a careful study of it, and Mr. Mally observed it in abundance in the summer of 1899, at Des Moines, Iowa.

We have been informed that the species has been described by Mr. Ashmead in a paper to be published "shortly."

Here at Wooster, not a plant could be found that was not infested, including all plants in the greenhouse, by July 1, 1898. It is quite effective in checking the purslane, in many places the plants not developing seed, due to the destruction of the leaves.

The eggs are deposited in the edge of the leaves, deposition usually being completed in ten to fifteen seconds. In no case was a female observed to deposit on the flat surface of the leaf, or on the stem. As soon as hatched the larvæ begin to feed on the leaf, and ultimately mine out the greater part of the pulpy substance, but never eat through the surface until driven to do so from lack of food, when they emerge and make their way to a fresh leaf, immediately enter and continue their mining habit, apparently not feeding on the surface at all, except as they cut their way into the leaf. In numerous instances, where the obtainable leaves had all been exhausted, the larvæ bored downward in the stems of the plant. The larvæ do not drop readily from the surface of the plant, and, when handled with forceps or needle, they exude a clear viscid substance which holds them in place.

When fully developed, the larvæ enter the ground to the depth of one-half to one inch and form a silken cocoon, to which bits of soil adhere quite firmly, and there transform. The pupa stage lasts only about seven days, when the adults emerge, a few males in advance, soon after which the sexes pair and oviposit.

In nine cases out of ten distinct experiments in the insectary, in rearing the adults, the time of the larva entering the soil, and the

* Read before the Ohio Academy of Science, December 22, 1899.

emergence of the adult, was within a few hours of seven days, and in the other case the time was a few hours over eight days. An observation by Mr. Mally on the actual time passed in the pupa shows that a larva descending into the ground at 5:00 p. m. had formed the cocoon by 5:00 p. m. the next day, and was still in the larval state the second day. The exact length of time required in the different stages has not been determined, but the entire cycle is complete in about three weeks, thus making probably six generations in a year.

During the summer of 1899, commencing June 6, a series of breeding experiments was carried on, out of doors, with plants grown in breeding cages, upon which each generation was colonized. During May purslane plants were transplanted from the insectary to the garden, with a view of thus attracting the earliest appearing adults. On June 5 larvæ were noticed in abundance, not only in these trap plants, but also in larger plants growing promiscuously in favored spots, one very small individual being observed in an adjoining garden on a very young plant, these larvæ clearly representing the earliest generation of the season. The trap plants were covered immediately with a breeding cage, and on June 15 a number of adults, all females, were observed in the cage. Nine of these females were transferred to cage No. 2, upon plants that had been brought from the insectary, and in which no larvæ were working. Two males and two additional females were captured in the field, and also placed in this cage, which then contained in all eleven females and two males. One of these females was observed to oviposit in the leaves. On June 22 the very young larvæ were first observed beginning to feed in the leaves. July 5 the first adult, a female, was observed, evidently having just emerged. It is an interesting fact that though this female was just drying her wings, several males were observed hovering about the cage in vain effort to effect an entrance. July 7 three females and ten males from the cage were placed in cage No. 3, provided with plants obtained from the same source as the preceding. July 14 quite a number of larvæ were observed in this cage working in the leaves. July 28 adults were observed. On the 29th three females and six males were placed in cage No. 4. August 16 two males were observed in this cage. As these males marked the generation, three females and one male were taken from cage No. 3 and placed in cage No. 5. On September 5 one female was observed in this cage, and determines the fifth generation, but up to September 15 it had been im-

possible to secure males outside, as not an individual of either sex could be found. But on September 18 a number of larvæ, varying in size from very small ones to those fairly well developed, were observed in plants in the near vicinity. These plants were transferred to a breeding cage. The larvæ disappeared, and, as they could not escape from the cage, they must have either entered the ground or perished from lack of food,

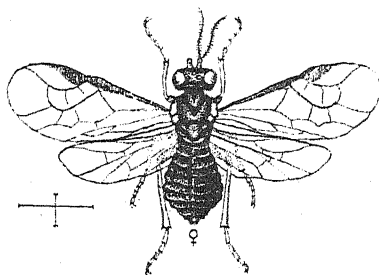


FIG. 1.

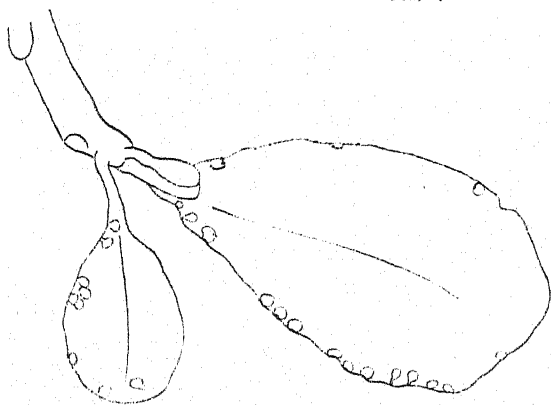


FIG. 2.



FIG. 3.

as might have been the case with the younger, on account of severe frost and freeze September 26, which killed the plants.

On September 30, 1898, quite an extensive search was made for adult sawflies, but none could be found. Found numerous larvæ, varying from real young to full-grown individuals. Numerous adult parasites were found also. The frost killed the plants about this time, thus closing the breeding season.

In the light of these two records it may be said that the exact number of broods for any given year may depend on the date of occurrence of the earliest killing frosts.

The sudden and almost total disappearance of this species during the latter part of August and first of September was undoubtedly mainly due to the immense numbers of a parasitic species, which Mr. Ashmead has determined as belonging to the genus *Ichneutes*, and probably new to science.

An interesting observation was made in connection with a large breeding cage out of doors, for the purpose of breeding parasites. The adult sawflies began emerging in great numbers, and, to our surprise, were found almost swarming on the outside of the cage. Our first impression was that the cage was imperfect at some point, and that they were making their escape, but such was not the case. On examination we found that the specimens on the outside were all males, evidently attracted by the females in the cage. There were no purslane plants to amount to anything within two or three rods of the cage, but at a distance of five or six rods, in two directions, were garden patches well stocked with purslane and larvæ, furnishing an abundance of sawflies.

During the summer of 1898 a female, with a male antenna, was found in one of the breeding cages. A notice on this, written by Mr. Mally, appears in the seventh annual report of the Ohio State Academy of Science, pp. 34 and 35, illustrated by the accompanying figure (Fig. 1). The oviposition is shown in Fig. 2, place of eggs in leaf; and Fig. 3, egg in position.

A POPULAR NAME FOR CLISIOCAMPA DISSTRIA.

SIR,—I am much interested in Mr. Slingerland's note on the new popular name for *Clisiocampa disstria* in the CANADIAN ENTOMOLOGIST for January. I once wrote an editorial for "Insect Life" on popular names (Vol. VII., pp. 363, 364), in which I gave utterance to a certain distaste for "book names" and to a preference for the popular name which grows up among the people. Such names are rarely specifically distinctive, but they are usually catchy, frequently phonetic, and more or less descriptive.

I am not sure that we have any legitimate popular name for the forest tent caterpillar. The one just mentioned is obviously a book name

derived from the popular name of its nearest relative, the orchard tent caterpillar, but it is misleading, as Mr. Slingerland points out, since the larva of *Clisiocampa disstria* does not make a tent. It is interesting to know that the sympathetic and altogether united organization known as the "Jugatae" has not falsified its name in this instance, but has joined with Mr. Slingerland in concluding that the "forest tent/less caterpillar" would be an appropriate name for this species.

Since Mr. Slingerland invites suggestions, it occurs to the writer that there are so many hundreds of other forest caterpillars which are tentless that the name lacks the specific quality which is desirable. In answer to his question, "Has anyone a better name to suggest?" I might propose "the tin-horn caterpillar," or "the brass-band caterpillar," referring to the startling discoveries which were made in south-western New York last summer, and which, the writer is informed, Mr. Slingerland intends to investigate next season. Alternatively, the name "the railroad-train obstructor," or "the slippery-when-smashed caterpillar," might be suggested, since this is the species which is at the bottom of all the newspaper stories of railway trains being stopped by caterpillars. Or, since the damage of the last few years is said to have seriously reduced the crop of maple sugar, the insect might be called "the maple-sugar adulteration-promoter."

Seriously, however, why would not "forest army worm," or "the army worm of the forest," be quite the most appropriate and distinctive name which could be suggested?

L. O. HOWARD, Washington, D. C.

MR. C. W. MALLY, M. Sc., assistant to Professor F. M. Webster in the Entomological Department of the Ohio Agricultural Experiment Station, has been appointed Assistant Government Entomologist of Cape Colony, South Africa, and has left for his distant sphere of labour. Mr. Chas. P. Lounsbury, who also went from the United States a few years ago, is in charge of the Entomological Department at Cape Town.

THE DESTRUCTIVE GREEN-PEA LOUSE.

BY WILLIS G. JOHNSON, COLLEGE PARK, MD.

Perhaps never in the history of economic entomology has an undescribed species of insect appeared so suddenly and over such a wide area, and in such destructive numbers, as the "destructive green-pea louse," the popular name I have given the insect herein described. It has occurred, during the past season, in Maryland, Delaware, Virginia, North Carolina, Pennsylvania, New Jersey, New York (Long Island), Connecticut, Vermont, Maine, Ohio, and Canada (Ottawa).

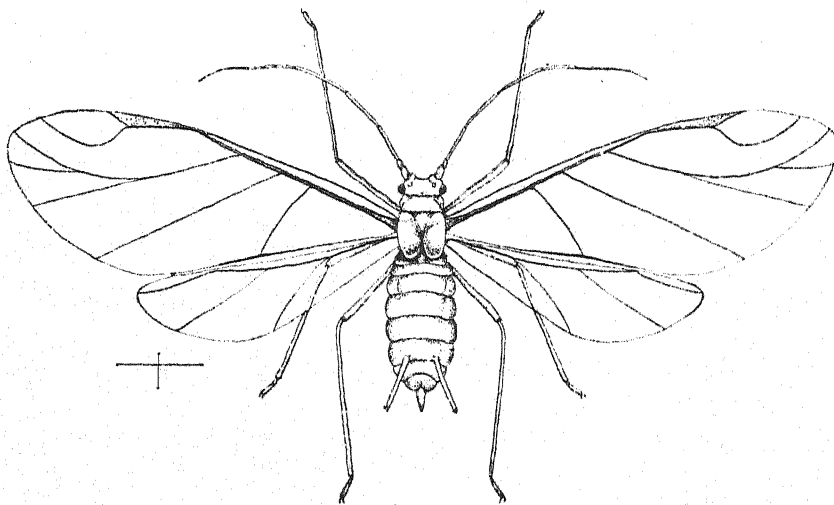


FIG. 4.--*Nectarophora destructor*, winged form. A typical representation. (Original.)

It belongs to the family Aphididae, and the familiar and extensively-used genus Siphonophora. Unfortunately, however, Koch overlooked the fact that Siphonophora, as a generic term, was already appropriated for the Myriapoda before he made use of it in his Aphididae; it is also used to denote an order of the oceanic Hydrozoa. In accordance with modern practice, therefore, it is fitting that we should drop the name Siphonophora and recognize some other. In his synopsis of the Aphididae of Minnesota, O. W. Oestlund proposes the name Nectarophora to take the place of Siphonophora. I see no reason why it should not stand, and place the species described below under that generic name.

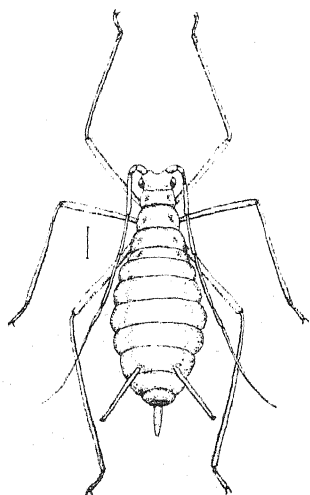


FIG. 5.—*Nectarophora destructor*, apterous form. (Original.)

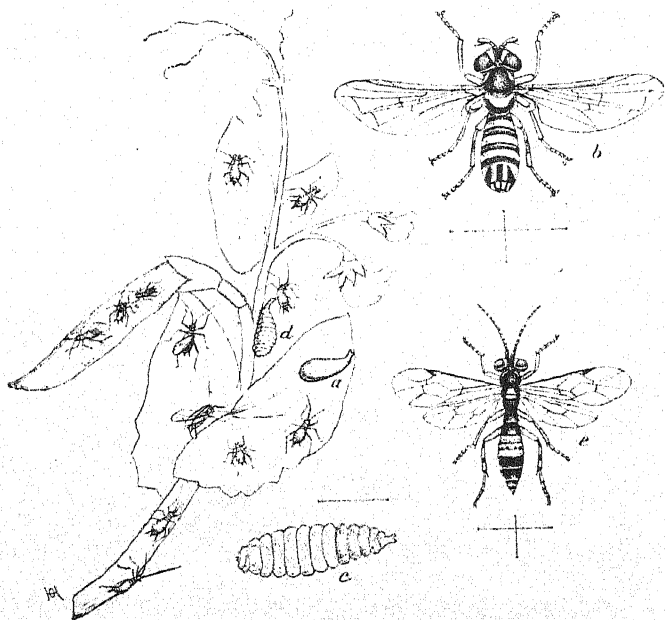


FIG. 6.—*Nectarophora destructor* and its principal enemy, *Allograpta obliqua*: a, pupa on leaf; b, adult; c, larva; d, larva feeding; e, *Bassus latiorius* (female). Hair lines represent natural size. (Original.)

Nectarophora destructor, n. sp. —The general colour of both winged and wingless individuals is green; conforming so closely to that of the pea plant itself, we might, perhaps, better call it pea-green. The colour, however, varies slightly with the age of the insects; the young when first born are lighter, still bordering the greenish shade of the adult; old or spent females are lighter, some having a greenish-yellow tinge. In many instances individuals in a colony will be seen of a yellowish or creamy tinge. Such individuals are usually affected with a fungous disease. The variation in colour may, therefore, in many instances be attributed to some abnormal condition.

The general form of the body in both winged and wingless specimens is elongate and fusiform, the latter being slightly the larger. The average length of the body in both forms is about 4.50 mm. Eyes are red and prominent; colour showing conspicuously in specimens mounted in Canada balsam. Antennæ lighter than body; tubercle prominent; joints darker than rest of segment; seventh joint quite filiform and fuscous. Legs long and conspicuous; tarsi, distal ends of tibia and femora fuscous. Honey-tubes fuscous at tips, otherwise concolorous with body.

Winged Female.—Colour pea-green. Fore wing about 5 mm. from tip to base and about 2 mm. wide at broadest part; entire wing expanse about 11 mm. Length of body, including style, generally 4 to 5 mm.; some cases where the female is distended with young the length is 6 mm. Width of body varies from 1 to 1.50 mm., depending on condition of specimen. Antennæ long and slender, reaching to or slightly beyond the tip of the style; first and second joints short and closely joined to tubercle; other joints vary slightly; the following measurements represent the general average of a long series: III. 1.50 mm., IV. 1.00 mm., V. 0.75 mm., VI. 0.50 mm., VII. 1.50 mm. Wings transparent, veins slender, typically represented in Fig. 4. Honey-tubes long, slender and cylindrical, extending beyond the tip of the abdomen, in some cases to the tip of the style; they are usually about one-fifth the length of the body, varying from 1.00 mm. to 1.50 mm. Style conspicuous, about half the length of honey-tubes.

Apterous Female.—As a rule, slightly larger than the winged female. Colour pea-green. Body slightly more elongate and fusiform than winged specimens; length varying from 4 to 6 mm.; width varying from 1 to 2 mm. Antennæ reaching beyond the tip of the style; length of

joints varying considerably. Honey-tubes same general shape as in winged specimen, but longer, extending beyond the tip of the style; length varying from 1.25 mm. to 2 mm. Style longer and more nearly conical than in winged individuals. Typical form of apterous female is shown in Fig. 5.

Described from many living and dead viviparous females of both forms from Maryland, New Jersey, Connecticut, Ohio, and Ottawa, Canada. Found on green field pea, sweet peas, and kept for a time on clover. Types in formalin and alcohol deposited in the U. S. National Museum.

General Notes.—I have given this insect much study during the past season, and still have a colony under observation (Jan. 29, 1900) in my laboratory. There is no cessation of the reproduction of young. As yet we have not been able to obtain eggs of the species, although several hundred mature apterous females were collected just before our coldest weather late in December and placed in tubes. We also made field observations late in December, and while we had no difficulty in finding the insects close to the ground on the under side of the leaves of volunteer peas, we are still in doubt as to how it passes the winter. I am of the opinion that, under favorable conditions, the female will continue to reproduce young throughout the winter. That the species will survive severe freezing and reproduce later was conclusively tested in our laboratory. A colony upon a bunch of peas in water were frozen late in December so that there was ice half an inch thick in the cup. A week later, when heat was again turned on the building, the insects became active and commenced reproduction a few days later.

Thomas reports a similar case. He observed the wheat-plant louse (*Nectarophora avenæ*) breeding in mid-winter, and took specimens from wheat while the snow was on the ground.

There is also a probability that the late apterous females deposit eggs. Mr. W. H. Ashmead tells me he has frequently seen the eggs of an allied species, which is abundant on tulip trees about Washington. The eggs are usually deposited about the base of the leaf buds.

In my breeding experiments and field observations, I have been struck with the seeming absence of hymenopterous parasites upon this insect. Such a condition is quite uncommon where there is such an abundance of plant lice, for, as a rule, they abound. I have bred but a single hymenopterous parasite, *Bassus lætorius* (♀), Fab., shown in Fig.

6 at ϵ , and this is supposed to be parasitic upon the *Syrphus* larvæ. In Canada, Dr. James Fletcher informs me he has bred *Praon cerasaphis* and *Aphidius Fletcheri*, a new species recently described by Ashmead; while in Delaware, Professor E. Dwight Sanderson has bred another species of the genus *Aphidius*, namely, *A. Washingtonensis*, from the destructive green-pea louse.

In my field observations I have found the predaceous insects very important factors in the destruction of this plant louse. I have observed four groups of insects at work upon them: First, and most important, the *Syrphus* flies; second, lady beetles; third, lace-winged flies; and fourth, soldier beetles.

Of the *Syrphus* flies, we bred *Allograpta obliqua*, Say; *Syrphus Americanus*, Weid., and *Sphærophoria cylindrica*, Say. The first named was by far the most abundant and important species. On a farm where 600 acres were planted in peas, and where the plant louse totally destroyed 480 acres, the larvæ of *A. obliqua* so completely destroyed the plant lice by the second week in June that hardly a specimen could be found. In the language of the proprietor, who owns a large cannery, he says: "The last few days I packed, the separator sieved out about 25 bushels of green worms, which no doubt proves they destroyed the plant lice." These "green worms" were the larvæ of *A. obliqua*, illustrated in Fig. 6. The other two species were not so abundant.

Of the lady beetles the most important were *Coccinella 9-notata*, *Hippodamia convergens*, *Megilla maculata* and *Coccinella sanguinea*.

The larvæ of *Chrysopa oculata*, Say, were also abundant upon the infested vines. I observed the soldier beetle, *Podabrus rugulosus*, Lec., feeding voraciously upon the plant lice.

From what I have seen of the ravages produced by the destructive green-pea louse, and our inability to combat it on a large scale, I consider it one of the most important pests on the already long list of noxious insects. Whether it will appear again next year over the same general territory on the field pea remains to be seen; but I am of the opinion it will not be as destructive as the season just past. The superabundance of *Syrphus* flies and lady beetles over certain areas will certainly have a balancing effect in nature.

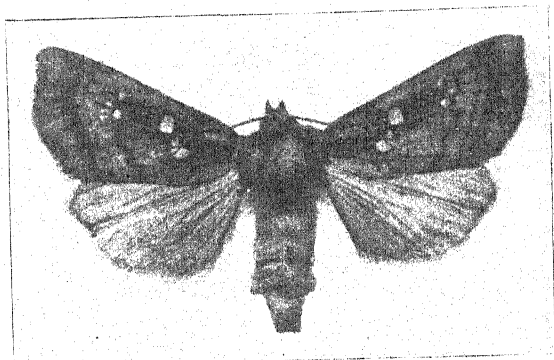


Fig. 1.

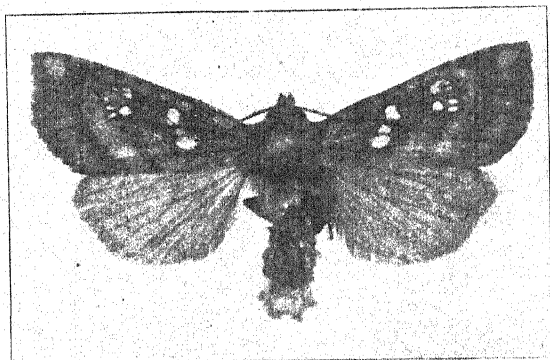


Fig. 2.

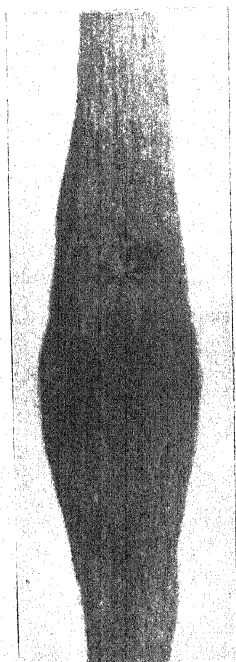


Fig. 4.



Fig. 3.

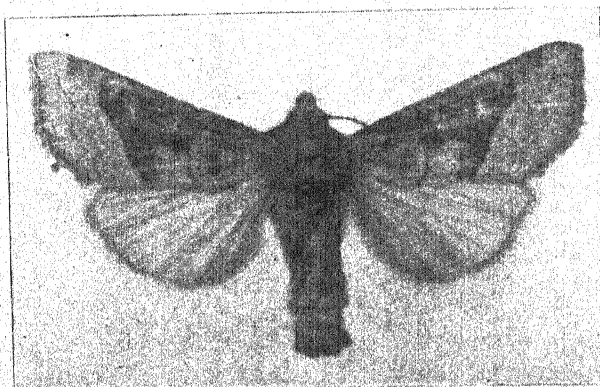


Fig. 5.

The Canadian Entomologist.

VOL. XXXII.

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No. 3

CONTENTS.

| | | | |
|--|----|--|----|
| Moffat— <i>Hydræcia stramentosa</i> | 61 | McNeill— <i>Orchelimum</i> | 77 |
| Tinsley—Contributions to Coccidology..... | 64 | Dyar—North American Yponomeutidae | 84 |
| Caudell—A new species of <i>Sinea</i> | 67 | Fyles—Observations on <i>Bombyx cunea</i> , etc.. | 87 |
| Grote—Popular name for <i>C. distria</i> | 68 | Butler—Note on <i>Cyaniris pseudargiolus</i> | 91 |
| Needham—Nymphs of northern Odonata . . | 69 | Cockerell—New oak-gall from New Mexico . | 91 |
| Martin—A study of <i>Hydrometra lineata</i> | 70 | Dodge— <i>Pyrameis Huntera</i> , n. var. <i>Fulvia</i> ... | 92 |

HYDRÆCIA STRAMENTOSA, GUEN.

Plate 2, Fig. 5, nearly twice natural size.—I here copy in full the description of the species, as given by Dr. J. B. Smith in his recent revision of the genus *Hydræcia*, in the Transactions of the American Entomological Society, Vol. 26, May, 1899. Also his remarks on and about this interesting species.

"*Hydræcia Stramentosa*, Gn.—1852—Gn., Spec. Gen. Noct. 1, 129, pl. 6, F. 2. *Hydræcia*.

"Ground colour a rather dull luteous, with a dash of olivaceous. Collar with a narrow brown line above the middle, the tip distinctly smoky, as are also the tips of the thoracic tuftings. Edges of the patagiæ marked with smoky brown, which is particularly well marked at tip. Sometimes the entire thorax is darker, and in such cases the contrasts between the ground colour and the markings just described are not great. The abdominal tuftings at the base are also dark. The primaries have a reddish shade over the costal region extending to the tip. The outer portion of the median space is distinctly darker, olivaceous, and stands out quite evidently from the rest of the wing. The basal line is geminate, fairly well marked on the costa, then broken and only marked as a spot below that point. T. a. line geminate, the inner line scarcely traceable below the cell: as a whole it is nearly upright, but is inwardly curved through the cell and has a very feeble outcurve below that point. T. p. line very even, rather abruptly bent on the costa, a little outcurved over the reniform, and then evenly oblique inwardly to the inner margin. S. t. line irregular, brownish or smoky, marked by a preceding shade in

the costal region, and beyond that by dusky scales arranged quite regularly. There is an even line at the base of the fringes, which are dusky at tip and have a reddish shade toward the base. The median shade line is well marked on the costa and is blackish to the median vein; below that point it is olive-green and hardly darker than the shading of the outer part of the median space. In the costal region, between the outer part of the basal line and inner portion of the t. a. line, there is a blackish shading, and a similar, though much less marked, shading extends from the inception of the t. a. to the median shade line. The ordinary spots are well marked; the claviform is slightly soiled, olivaceous in colour. Orbicular almost upright, irregularly oval, of the ground colour or a little paler, outlined in olivaceous. Reniform upright, oblong, the angles pointed, hardly constricted in the centre. It is of the ground colour, or may have a slightly reddish tinge. Secondaries pale yellowish, without obvious markings. Beneath yellowish, both wings with a smoky outer line, which, in the specimens before me, does not extend across the wing. Expanse 1.68-1.72 in.; 42-43 mm.

"Hab.—Glenwood Springs, Colorado, September 10th, October 1st, foothills near Denver. 'Middle and Central States, New York, Illinois.'

"Three specimens have been under examination, and I have seen others. None of them, however, are from the East. There is a question, perhaps, whether this species is correctly identified. The examples before me agree with Guenée's figure and description, and I cannot remember having seen any species from the east which might be fitted to them. While I saw the type in the British Museum some years ago, my recollection does not serve sufficiently well to enable me to say whether or not this is really his species. I believe it to be so, and that probably in his original description, the locality, 'New York,' was an error. The other localities given in my Catalogue followed Mr. Grote's notes. I have never seen any specimens of *Stramentosa* identified by Mr. Grote. The specimens before me are all very much alike, and they are evidently related to *Immanis*."

The disclosure that *H. Stramentosa*, Gn., has been taken regularly at Montreal for years past by collectors connected with the Branch of the Ent. Soc. of Ont. there, is in great measure a re-discovery of the species in the East, apparently none knowing of its existence there except themselves. It appears in the early printed lists of our Society as an

Apamea, and I, being desirous of obtaining an example for the Society's collection, enquired of correspondents who I thought were likely to know, but none of them had ever seen it, or could give any information about it. There is an insect in the D'Urban collection which was made in Quebec, labeled *Hydræcia Stramentosa*, in Walker's handwriting, but it does not even belong to that genus. And when I read Dr. Smith's remarks, quoted above, I concluded that it had got into our list by mistake, and that it was not to be looked for in Canada. But one is always liable to find cause to change their conclusions.

Having received some material from Montreal for names, there was amongst it a fresh, bright orange-yellow specimen of *Hydræcia* with purple bands, which so closely resembled the *purpurifascia* in our drawers, that, without giving it critical examination, I placed that name opposite its number. When the specimens were returned, Mr. Brainerd objected to that name; not that he claimed to be able to distinguish the species, but he thought there was not enough of the food-plant of *purpurifascia* about Montreal to feed a tithe of the moths that could be taken there, remarking that they had been calling it *rutila*, and suspected that I must be wrong. Being so different in colour from all the *rutilas* I had seen, I hesitated to accept it as such; so obtaining another specimen, I referred it to Dr. Smith, who pronounced it to be "a very typical specimen of that species." When I informed Mr. Brainerd of the decision being in his favour, I requested from him another specimen if he could spare it, which he kindly sent, and said, "With it I put one of what we call *Stramentosa*, which is the only other common species here except *Nictitans*," which proved to be the true *H. Stramentosa*, Guenée, and thus, by a fortunate error on my part, has its presence there been disclosed to the rest of the Entomological world.

When I informed Dr. Smith of the discovery, he replied: "I am delighted to hear of its occurrence there, and it may be now that it will turn up in the northern or mountainous districts of New York or New England. I must say I hesitated long before I dared to identify Guenée's description as I did, with no sort of proof that the species occurred this side of the Rockies."

Mr. Brainerd intends to make a vigorous effort to discover its food plant next season, and so obtain the larva for description.

J. ALSTON MOFFAT, Curator Ent. Soc. of Ont.

DESCRIPTION OF PLATE.

The photos for the plate were taken by Mr. Dwight Brainerd, Montreal.

Figs. 1 and 2 are a natural pair of *H. rutila*.

Fig. 3 is a pupa of *H. nitela*.

Fig. 4 is a gall of same, showing the opening made by the larva.

Fig. 5, *H. Stramentosa*.

All enlarged.

CONTRIBUTIONS TO COCCIDIOLOGY.—II.

BY J. D. TINSLEY, A. AND M. COLLEGE, MESILLA PARK, N. M.

During the past summer I have had the opportunity, through the kindness of Dr. Howard, of working over the unnamed material of the genera *Dactylopius*, *Ripersia*, and *Phenacoccus*, belonging to the collection of the Division of Entomology, U. S., D. A. I wish to record here the identity of *D. vastator*, Mask., with *D. filamentosus*, Ckll., and two species which I believe to be new. I hope in a subsequent paper to give further notes on some of the other species found, and also to record the new host plants found for a number of species.

Dactylopius filamentosus, Ckll., syn. *Dactylopius vastator*, Maskell.—I have before me a considerable quantity of material, specimens as follows: Type material of *D. filamentosus*, Ckll.; material from Island of Mauritius on Citrus sent by De Charmoy; and the following from U. S. D. A., Div. Ent.: 7232 on *Hibiscus*, Richmond, Natal; 7706 on Orange, Cape Town, Africa (Coll., Lounsbury); 5820 on Tamarind and Citrus, Honolulu, Sandwich Is. (Coll. Koebele). After carefully examining and comparing individuals from each lot of material, I can find no characteristic differences, and must therefore conclude that they are all one species. Since Cockerell described *filamentosus* in 1893 (The Entomologist, Vol. XXVI, p. 268, Sept., 1893), and Maskell described *vastator* in Trans. N. Z. Inst., 1894, p. 65, *D. vastator*, Mask., will have to stand as a synonym of *D. filamentosus*, Ckll.

The No. 5820 material is of considerable interest, it being topo-type, and is that referred to by Maskell, *loc. cit.* The most prominent characters of this species are: the habit of aggregating into masses; the abundant white or yellowish secretions; and when boiled in potash staining the liquid a dark purple to blue-green and themselves turning blue-green; they are very hard to clear; the antennæ are of 7 segments:

segment 1, 37-45 μ long; segment 2, 37-39 μ long; segment 3, 28-40 μ long; segment 4, 28-34 μ long; segment 5, 22-31 μ long; segment 6, 22-34 μ long; segment 7, 73-84 μ long; legs, femur about 140 μ long; tibia, about 100 μ long; tarsus, about 70 μ long; derm bearing peculiar spear-shaped spines. This species does not resemble *D. Townsendi*, Ckll., as supposed by Maskell. It resembles *albizziae*, Mask., and *hymenocleæ*, Ckll., in producing the blue-green pigment in potash, but is distinct from them in the secretion and anatomical characters.

Dactylopius Texensis, n. sp.

Specimens have been in alcohol since Dec., 1895. Adult ♀; length about 3 m. m.; nearly as wide as long; shape rather sub-globular; colour light brown. I know nothing at present of the secretion. Epidermis bearing scattered, medium-sized hairs and numerous small glands; margins of body with areas of glands and stout conical spines. Antennæ of eight segments: segment 1 rather large, 53-59 μ long; segment 2 rather wide, tapering slightly toward the proximal end, length 48-51 μ ; segment 3 about three-fourths the width of 2, cylindrical, 52-62 μ long (the length of this segment may be either less than, equal to or greater than that of 1, they are often nearly sub-equal); segment 4 quite short, 20-28 μ long; segment 5, 28-37 μ long; segment 6, 25-31 μ long; segment 7, 31-39 μ long; segment 8 usually about 84 μ long. Among observed formulæ are: 8312 (57) (46), 83127564, 81327 (56) 4. The segments bear one or more whorls of medium-sized hairs.

Legs rather short and stout; femur about 182 μ long by 82 μ wide, bearing numerous medium-sized hairs; tibia, 132 μ long by 35 μ wide, bearing several rows of small hairs; tarsus 65 μ long; tarsal digitules long, slender, knobbed hairs; claw stout, 31 μ long; digitules of claw long, slender, knobbed. Mentum elongate. Anal lobes not conspicuous, bearing the usual long spine, and areas of cones, hairs and spinnerets. Since the specimens are alcoholic, we know nothing of the ovisac. Eggs unknown. Male unknown.

Hab.—On *Acacia Farnesiana*, Willd.; San Diego, Texas, Dec., 1895. U. S. D. A., Div. Ent., No. 6961.

Remarks.—This species resembles *D. Ryani* in antennal formula, but differs in having the antennæ smaller and the legs shorter and stouter. Resembles *D. dasylirii* in the general form of the antennæ, but differs in having segments 3 and 1 of antennæ usually longer than 2, and differs very much in the shape of the body.

Dactylopius Farnesiana, Targ., found on *Acacia Farnesiana* at Vicenza, Italy, seems to be quite a different insect. I also have before me a *Dactylopius*, in alcohol, on sugar cane from Mauritius, U. S. D. A., Div. Ent., No. 6596, sent the Dept. by Miss Ormerod; these specimens I take to be the ones mentioned by Maskell in Trans. N. Z. Inst., 1896, p. 321; see also Insect Life, Vol. VII, p. 430. This *Dactylopius* differs in no material points from the *Texensis*. The general appearance of the alcoholic specimens is the same, the measurements of the segments of the antennæ come within the limits given for *Texensis*; the femur is same length as in the above; tibia is a little longer, one being $160\ \mu$; tarsus is also a little longer, $90\ \mu$; claw is more slender. I do not consider these differences sufficient for separating them, but it may be that when complete specimens of each are obtained there may be differences in colour, ovisac, etc., which may separate them. It seems strange that a species should be found in such widely-separated localities, and especially upon such different host plants.

Ripersia serrata, n. sp.

Adult ♀. Length, including fringe, about 2 mm.; width nearly 2 mm. Shape broadly elliptical. Colour of dried specimens blackish. There are three rows of beaded secretion on the dorsum: two lateral and a median, with the dark body showing up more or less between them, the median is most prominent. On the margin of the body is a fringe of projections; these consist of pairs of rods which become somewhat shortened and dentate toward the anterior extremity, while those of the posterior extremity of the body are longer and more distinctly rodlike; their length is usually less than half the width of the body. The general appearance of this insect, with its secretion, suggests that of *Dactylopius pseudonipæ*, and species of *Orthezia*.

Margin of epidermis bearing areas of several stout conical spines and numerous glands; numerous small glands scattered over the epidermis, and also a few scattered hairs.

Antennæ rather slender, of six segments, the relative lengths rather variable; first segment $20-25\ \mu$ long, second $22-28\ \mu$, third $28-34\ \mu$, fourth $17-20\ \mu$, fifth $20-25\ \mu$, sixth $48-56\ \mu$. Some observed formulæ are: 632514, 632154, 63(125)4, 63(25)14, 63(12)54. The segments bear whorls of medium-sized hairs.

Legs rather slender for a *Ripersia*; femur $85-100\ \mu$ long by $35\ \mu$ wide; tibia about $70\ \mu$ long; tarsus about $47\ \mu$ long; claw rather stout;

tarsal digitules rather stout, knobbed; digitules of claw longer than the claw and knobbed. Hairs on legs rather small and scanty.

Anal lobes rather prominent, bearing a large seta $75\ \mu$ long, and a number of quite stout conical spines and spinnerets. Anal ring normal. Female ovisac unknown.

Eggs and larvæ unknown. Male unknown; male sac white, elongate, about 2 mm. long and 75 mm. wide.

Habitat.—On a creeping vine. Collected by H. Caracciolo, Port of Spain, Trinidad, W. I.; Jan. 27, 1894.

Rem.—This is No. 6160 of the U. S. D. A. collection. The most marked characteristic of this species is the peculiar arrangement of the secretion described above. It seems to resemble *R. filicicola*, Newst.

A NEW SPECIES OF SINEA.

BY A. N. CAUDELL, DEPT. OF AGRICULTURE, WASHINGTON, D. C.

Sinea complexa, n. sp.—Length, ♂, 8 to 9.5 mm., ♀, 9.5 to 11 m.m.; width, ♂, 3 mm., ♀, 3.5 to 4.5 mm. General colour ranging from a very dark brown to pale cinnamon. Head armed with three pairs of anteocular spines, the posterior pair the longest, with smaller ones interspersed. Behind the eyes, with several sharp spines, one near each ocellus being almost as long as those of the posterior anteocular pair. Neck spinose. Antennæ somewhat pallid, with a slight rufous cast at the distal ends of the segments.

The anterior femora are much swollen and armed with the usual long, sharp, dorsal spine, and with ten spines beneath arranged in two longitudinal rows. The last two spines of the inner row are much larger and longer than the others, and the terminal one is out of alignment, so that it is rather on the dorso-lateral surface. (*Sanguisuga* and some other species also show this arrangement of spines on the anterior femora, but in these cases there is no striking enlargement of the spines, and hence it is not so noticeable. The nymphs of *diadema*, and probably other species as well, have dorso-lateral spines on the anterior femora.) This spine is almost as long as the dorsal one and, when the femora is viewed from the front, is quite prominent. In this view the second spine also is somewhat prominent. The anterior tibiæ have the usual double row of three strong spines below. They are pale towards the tip, with the apex black. The dorsal and two enlarged ventral spines of the anterior

femora also have the tips black. The hind and middle legs are without distinguishing characters.

Thorax with distinct, sharp spines on both lobes, those of the anterior lobe the longest. Breast spined, usually with blunt spines. Disk of the posterior thoracic lobe convex, hardly impressed longitudinally. Lateral angles quite acute, moderately prominent. Scutellum black, triangular, with raised centre and slightly turned up at the tip. Abdomen of both sexes wider than the hemelytra, considerably so in the females, where the margins are somewhat elevated and the sides rounded. Quite uniformly coloured, sometimes paler on the posterior borders of the segments near the lateral margins.

Described from specimens in the National Museum, from Los Angeles, California; collected by Mr. Coquillett. They were given the manuscript name *complexa* by Prof. Uhler. This name, with the kind consent of the author, I gladly adopt. Type No. 4433, U. S. Nat. Mus.

This species belongs to the *sanguisuga* group, characterized by a short, broad form, as opposed to the longer forms represented by *diadema*, *undulata* and *coronata*. It is quite a well-marked species, the distinctly spined posterior thoracic lobe, together with the peculiar armature of the anterior femora, readily separating it from its allies.

A NEW POPULAR NAME FOR CLISIOCAMPA DISSTRIA.

In the January number, Prof. Slingerland proposes a new common name for the "forest tent-caterpillar," and proposes "forest tentless-caterpillar." The objection would be, that "tent-caterpillar" is an English equivalent for *Clisiocampa*, and need not be altered whether the particular species makes a tent or not. What is needed in names is fixity, not relevancy. Another objection is, that *tentless* is not the antithesis to *tent*, but to *tented*. There is, on a previous page of the same number, a protest against changes in Latin terms in entomology, and also systems of classification. Whatever force lies in this protest is doubled when English names, which have no classificatory significance, are to be considered. I should therefore be in favour of retaining the names, "apple tent-caterpillar" and "forest tent-caterpillar," for the two species of *Clisiocampa*, now known under these common titles. If inapplicability were a valid reason for changing names in entomology, we should be quite lost. And the new name, "forest tentless-caterpillar," besides implying that the insect is not a *Clisiocampa*, ceases to be distinctive, for there are other caterpillars of the forest which are unprovided with tents.

A. RADCLIFFE GROTE, Hildesheim, Germany.

NYMPHS OF NORTHERN ODONATA, STILL UNKNOWN.

BY JAMES G. NEEDHAM, LAKE FOREST, ILL.

This is a word in season to collectors of aquatic insects, who may be afield during the months of spring and early summer.

Among the nymphs of Odonata occurring in the North-eastern States and Canada, there remain a number of good discoveries to be made. In any locality where these nymphs are common their discovery will not be a difficult matter. Nymphs of the following half-dozen species are pre-eminently desirable :

- | | |
|--|------------------------------------|
| 1. <i>Tachopteryx Thoreyi</i> , Sel. Atlantic States. No nymphs of its sub-family known. | |
| 2. <i>Gomphæschna furcillata</i> , Say. Eastern States. | } No nymphs of these genera known. |
| 3. <i>Nannothemis bella</i> , Uhl. Atlantic Seaboard. | |
| 4. <i>Neurocordulia obsoleta</i> , Say. Eastern States. | |
| 5. ? <i>Neurocordulia Uhleri</i> , Sel. Me. Mass., N. J. | |
| 6. <i>Somatochlora Lintneri</i> , Hag. N. Y., Saskatchewan. | |

The last-named genus, which is peculiarly a northern one in our fauna, is large and polymorphic. Even the imagoes are very insufficiently known, and few nymphs of fewer species have been taken, though they must be very common in proper localities. Canadian collectors have every advantage in the study of this genus.

While a large number of nymphs of Odonata have been collected and reared of late, descriptions of them have not, unfortunately, as yet got into print. The species above mentioned are among the most desirable of those which have not, I believe, as yet been found. I have had no difficulty in rearing all the genera and almost all the species occurring in the localities in which I have lived during the last five years : but these six have not come my way. I should be glad to help any one who wishes to undertake to find and rear these nymphs, by sending a printed account of the methods I have used successfully, and by the determination of dragon-fly material in all stages of development.

A STUDY OF HYDROMETRA LINEATA.

BY J. O. MARTIN, CORNELL UNIVERSITY, ITHACA, N. Y.

Among the reeds and rushes that border quiet streams and ponds lives *Hydrometra lineata*, one of the least known of our North American Hemiptera. This insect is comparatively rare in collections, but common enough in nature, though owing to its small size and inconspicuous appearance it escapes all but the sharpest-eyed collectors. Its elongate body is borne on hairlike legs and resembles a bit of twig or grass more than a living insect. After the eye becomes accustomed to the odd shape, they are most easily distinguished, especially when they move about over the surface of the water. During the past summer I took over five hundred specimens of this insect without any special effort, finding them common through New York State, Massachusetts, and Connecticut.

The appearance of this insect is unique and exceedingly grotesque, for the head, thorax and abdomen are so elongate and the legs so thin that it produces the effect of a minute Indian club stalking about on the water. Closer examination reveals a pair of solemn, protruding eyes situated at about the middle and on either side of the handle of this Indian club, while from the end a pair of threadlike antennæ are waved about in a mysteriously cautious manner. Underneath the head is the murderous beak, the common possession of all hemipterous insects. In very rare cases individuals may be found with a pair of wings closely folded upon the back and covered with leathery hemelytra, which are only to be detected by the use of a lens.

The economy of this elongate form becomes at once apparent on studying the habits of *Hydrometra*. In the first place, it reduces the insect's weight to the minimum and lessens the liability of breaking through the treacherous surface film upon which the life of this aquatic pedestrian is passed. In the second place, the long, cylindrical body is so like a bit of twig in appearance that *Hydrometra* is protected from his enemies and concealed from his prey, which do not in the least suspect in this apparent straw the presence of a deadly foe.

The genus *Hydrometra* was first established by Latreille in his "Precis des Caractères Generiques des Insects" (1797) p. 86. I have not had access to this book, but in his "Histoire Naturelle des Crustacés et Insects," T. xi., pp. 267-269 (1804), Latreille says: "I have taken the characters of the insect pointed out by Geoffery, *Cimex stagnorum*

(Linn.). My genus *Hydrometra* is easily distinguishable from *Gerris* in the following characters: Head drawn out into a long, cylindrical snout, recurvant and in a longitudinal groove the beak. These insects have the body very narrow, slender and linear, the head very long and slender, carrying at the extremity of the elongate snout two setaceous four-jointed antennæ. The eyes are large and globular and are situated near the middle of the snout; Linnaeus mistook them for tubercles. The thorax is long and cylindrical, the tegmina are very short and narrow and lie on the back, not occupying more than the interval between the second and third pairs of legs. The abdomen is very long and slightly larger than the anterior portion of the body; it is cylindrical and has two longitudinal keels, one on each side of the border. The legs are very thin and long, the middle pair being nearer the anterior pair than to the posterior. *Hydrometra* loves aquatic places, and runs with some agility on the surface of the water, but not very rapidly. It is this habit that gives them their name *Hydrometra* (water measurer)." When Latreille first established this genus it contained but two species, one from Europe, *H. stagnorum*, and another from the West Indies, the first serving as the type.

Cimex stagnorum (Linn.), Latreille's type, was placed by Linnaeus, who described it, in his heterogeneous genus *Cimex*, which included many widely different Hemiptera. Later naturalists in dividing up this genus placed *H. stagnorum* in various genera, such as *Gerris* and *Emesa*, until it was rescued by Latreille and placed in a genus by itself, which its unique characters well merited. Later, Burmeister,* setting aside Latreille's work, proposed the generic name *Limnobates* for this insect, and this name is frequently to be met with in comparatively recent books.

The United States, like Europe, has up to the present but a single species, and this (*H. lineata*) was first described by Thomas Say.† I quote the following: "*H. lineata*. Fuscous; hemelytra dull whitish with black nervures. Inhabits United States. Body fuscous or brown, more or less deep; hemelytra dull whitish or dusky, with black nervures; tergum pale, quadrilineate with black; two of the lines on the edge and the interval between the two inner lines, dull whitish or bright yellow; the incisures of the segments more or less black; beneath and feet obscure

* "Handbuch der Entomologie" (1839), Vol. II., No. 1, p. 210.

† The complete writings of Thomas Say on the Entomology of North America (Leconte's Edition), Vol. I., p. 361.

yellowish; thorax with a more or less obvious pale line. Length, seven-twentieths of an inch. This is very much like the *stagnorum*, F., but the hemelytra are not testaceous and there is no thoracic impressed line.

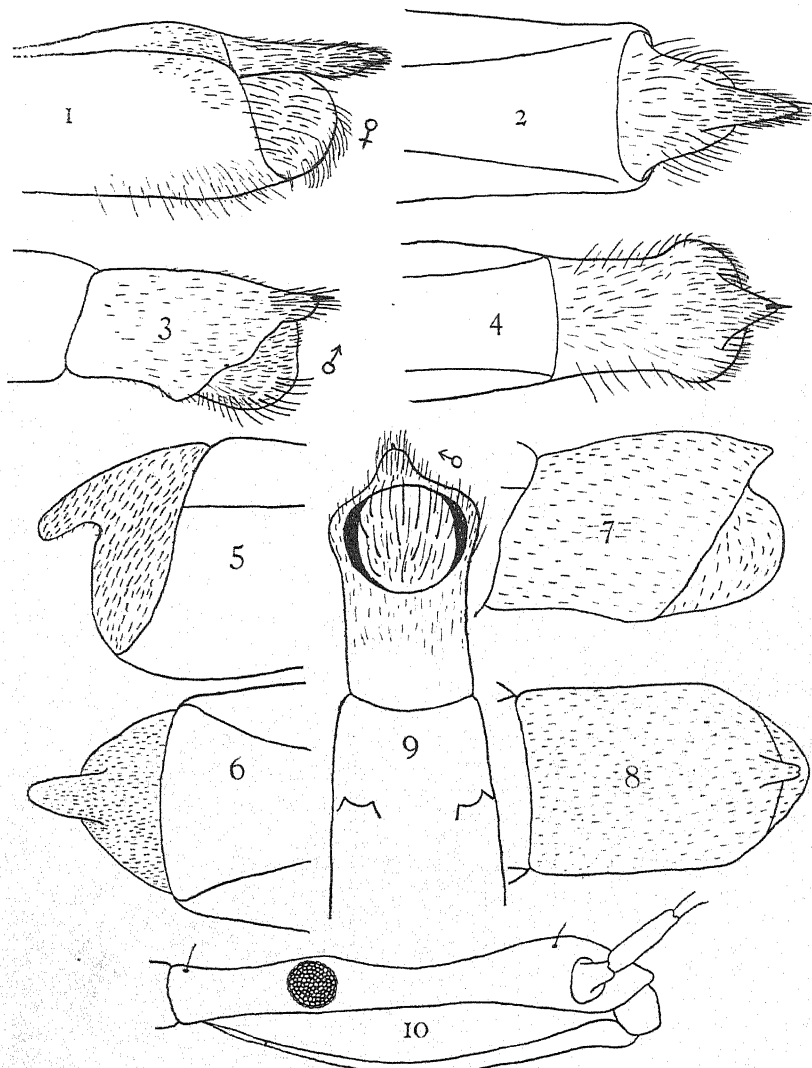
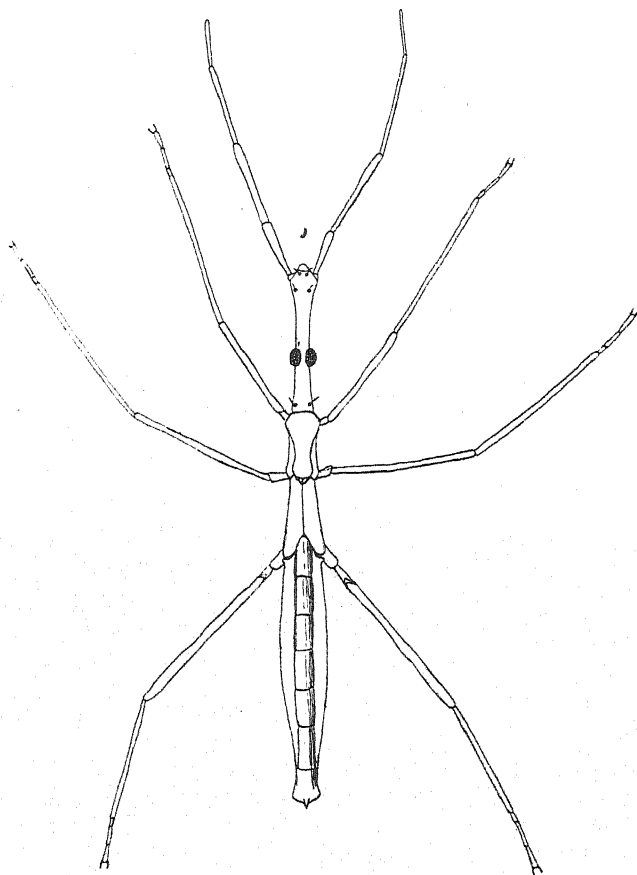


PLATE III.—Structural details of *Hydrometra lineata*.

FIG. 7.—*Hydrometra lineata*. Male.

EXPLANATION OF PLATE III.

Fig. 1.—Lateral view of genitalia of *H. lineata*, female.

| | | | | | | |
|---|---|---|---|---|-----------------------|---------|
| " | 2.—Dorsal | " | " | " | " | female. |
| " | 3.—Lateral | " | " | " | " | male. |
| " | 4.—Dorsal | " | " | " | " | male. |
| " | 9.—Ventral | " | " | " | " | male. |
| " | 5.—Lateral | " | " | " | <i>H. stagnorum</i> , | female. |
| " | 6.—Dorsal | " | " | " | " | female. |
| " | 7.—Lateral | " | " | " | " | male. |
| " | 8.—Dorsal | " | " | " | " | male. |
| " | 10.—Lateral view of head of <i>H. lineata</i> . | | | | | |

[Male?] Body blue-black ; thorax with a pale line ; antennæ and feet dark honey yellow ; tergum and venter without lines."

"Var. a. *Australis*. Head beyond the eyes a little longer and a little more dilated at tip ; second joint of the antennæ a little more dilated at tip ; abdomen with five lateral whitish points. Inhabits New Orleans."

It will be noted in the above description that Say could find no very specific difference between *H. lineata* and *H. stagnorum* ; by looking carefully at the genitalia of each, however, it is seen that there is a wide difference between them. It is in these fundamental structures that we find the variations which are best adapted for separating the species referred to in the above. Just what these differences are may best be seen by reference to Plate III., where Figs. 1 and 2 show lateral and dorsal views of the genitalia of the female *H. lineata*, and Figs. 3 and 4 show lateral and dorsal views of the male genitalia of the same species ; Figs. 5 and 6 are the genitalia lateral and dorsal of female *H. stagnorum* ; Figs. 7 and 8 are the same for the male of this latter species. The male is darker in colour than the female, and much smaller, the average length of twenty males being 8.8 mm., while twenty females averaged 9.7 mm. in length.

The peculiar habitat of *Hydrometra*, combined with its elongate form, has given rise to a secondary sexual character, which occurs in both *H. lineata* and *H. stagnorum*. This consists of two notched projections on the inner side of the sixth abdominal segment, close to the incisure between the sixth and seventh segments. The object of these notched elevations of the abdominal walls is to fit over the lateral keels of the female abdomen, thus steadying the abdomen of the male during copulation. This is rendered necessary not only by the elongate abdomen, but also by the fact that it is necessary for the insects to maintain their balance upon the water or run the risk of breaking through the treacherous surface film, an accident very likely to cause death. The abdomen in both sexes is stiffened and made rigid by a concentration of the segments along the venter, and by two keel-like lateral expansions of the abdominal segments. Along these keels the segments have become so firmly cemented that the joints between the segments do not show, thus giving to the keels the appearance of continuous structure.

The life-history of *H. lineata* is similar to that of other Hemiptera in that there are several broods during the summer. The insect hibernates in the adult stage, and during the first warm days of spring crawls stiffly out from under the rubbish along the banks, where it has passed the winter. When the weather becomes warm enough (the first to tenth of May at Ithaca), egg-laying begins ; the female becomes restless and stalks about in search of a place to deposit an egg. The laying of an egg by this stiff-abdomened, clumsy creature is accomplished in a very peculiar manner : Backing up to a grass stem or almost any firm object which

rises above the water, she exudes from the genital opening a drop of a gummy gelatinous substance, which she then presses against the object that has been chosen to support the egg. This sticky mass is the base of the egg-stalk, and hardening very soon, fastens the egg in place before it has left the body. The insect now walks away from the stalk, thus freeing herself from the egg. This egg, as may be seen from the drawing (Fig. 8), is long and spindle-shaped, with the micropile on the extreme end away from the point of attachment. The length of the egg is about two millimetres, a little more than one-fifth the total length of the insect apart from the antennæ, and about one-half the length of the abdomen. I was unable to determine how many eggs each female lays, for *Hydrometra* is not an easy insect to raise in confinement, being easily drowned in aquaria, and then the eggs are very hard to find where there is anything like an approach to natural conditions. The number cannot be very great, however, for the size of the egg is such that the abdomen could hardly contain more than four or five at the most. Each egg is attached to its support at right angles to the surface, but is frequently found hanging down as the result of some accident.



FIG. 8.—Egg of
Hydrometra.

The interior egg sac is protected by a horny exterior coating decorated with longitudinal ribs or flutings, the surfaces of which are granulated and marked by a rather indistinct hexagonal pattern; in the drawing this pattern has been exaggerated in order to call attention to its existence, for it is not at first apparent, and indeed does not appear to be present in some cases. Around the micropile end this protective coating takes the form of a series of plates, while around the stalk it extends in an enclosing sheath of a delicate tracery of network, through which can be seen the darker coloured supporting stalk. Mounted in Canada balsam this covering becomes more or less transparent, showing the oval pod-shape of the egg proper, with its slender stalk on one end and the micropile on the other.

Out of this egg there emerges, seventeen days after laying, the soft-bodied, light green nymph which has, as do all Hemiptera, the general characters of the adult. The nymph in this case

differs, however, from the adult in having the tarsi one-, instead of three-jointed. The body is so soft at birth and during the five moults which follow that the nymphs are frequently drowned, not being able to raise their bodies above the surface film so easily as do the more rigid adults.

During the summer there are varying numbers of broods, depending largely upon the length and temperature of the season, for this simple life-history is repeated as fast as the insects reach maturity.

Hydrometra is a carnivorous insect, its food consisting of the juices of insects that fall into the water, and the number of these is considerable along the grassy aquatic borders. When such a hapless insect falls into the water it is at once pounced upon by one or several voracious Hydrometras, who insert their beaks and proceed to suck the juices from their still struggling victim. I have seen no less than ten thus surround their prey, all with their heads in the direction of common interest and their bodies radiating outward. The body and legs of Hydrometra are covered with minute hairs, which prevent the body from being easily wet. The insect is constantly engaged in lifting its legs into the air to dry them, for if they once become wet they sink through the surface film just as would a floating needle. When Hydrometra does break through the surface film he is often able to free one leg after another, and then by main force raise his body up also.

In Lethierry and Severin's Catalogue of the Hemiptera there are listed eleven species of Hydrometra, but this list is not complete, for it does not contain *H. lineata*. These eleven species are mostly tropical and sub-tropical, with the exception of the European species and one from Siberia. One species from the Philippines may eventually become a member of the fauna of the United States, though at present *H. lineata* is our sole representative of this genus. It seems that subsequent study will show more species within the boundaries of the United States, and that Say's variety *australis* will be found to be a distinct species.

ORCHELIMUM, SERV.

BY JEROME M'NEILL, STANFORD UNIVERSITY, CALIFORNIA.

This genus of Orthoptera is confined almost entirely to North America, where it is represented by twenty or more species. Joseph Redtenbocher in his "Monographie der Conocephaliden," published in 1891, united *Orchelimum*, Serv., to *Xiphidium*, Serv. This action seems scarcely justified, as the two groups are quite as distinct as many other Orthopteran genera, and Redtenbocher's authority has not been generally recognized in this country. The species are distinguished with difficulty and the descriptions are widely scattered. These considerations have led me to attempt to make a key for their identification. It is quite possible that some of the species indicated are synonymous, but I am inclined to believe that all I have recognized are good, and I believe there are a considerable number undescribed. Many forms which differ from each other by very few structural differences are distinguished by some peculiarity of song or habit or habitat, and it is certain that a considerable number of them have been overlooked.

KEY TO ORCHELIMUM.

A. Hind femora not armed with small spines on the under side.

b¹. Ovipositor straight or very slightly curved; face not striped medially, pale.

c¹. Tegmina surpassing the tips of the femora more or less.

Length of the ovipositor 10 mm. or more, little if any less than two-thirds the length of the hind femora.

d¹. Pronotum short, less than one-fourth the length of the body and not more than 4 mm. long; tegmina only slightly surpassing the tips of the hind femora; a broad reddish-brown band upon the head and pronotum, somewhat paler in the middle. . . . *Delicatum*, Bruner.

d². Pronotum longer, more than one-fourth the length of the body and more than 4 mm. long; tegmina little if any shorter than the wings and reaching almost to the tip of the ovipositor; two well-defined narrow dark brown diverging lines upon the pronotum *Gladicator*, Bruner.

c². Tegmina not reaching the tips of the hind femora; ovipositor brown, much less than 10 mm. long. *Minor*, Bruner.

b². Ovipositor decidedly curved.

c¹. Size small, less than 14 mm.; tegmina without the two black lines usually present on either side of the speculum..... *Gracile*, Harr.

c². Size medium or large, at least 16 mm. long.

d¹. Face pale or unicolorous, never with reddish-brown or fuscous stripe down the middle.

e¹. Hind femora short, less than five-sixths the length of the body and not exceeding 15 mm. in length.

f¹. Tegmina not much exceeding the hind femora; ovipositor less than 9 mm. long; posterior margin of the lateral lobes strongly sinuate; anterior and middle tibiae green or yellowish..... *Vulgare*, Harr.

f². Tegmina far surpassing the tips of the hind femora; ovipositor more than 10 mm. long; posterior margin of the lateral lobes of the pronotum distinctly but not strongly sinuate; anterior and middle tibiae fuscous black..... *Robustum*, Red.

e². Hind femora longer, at least five-sixths as long as the body and not less than 17 mm. in length; ovipositor less than half as long as the hind femora.

f¹. Pronotum longer, more than one-fourth as long as the body; tegmina not far surpassing the tip of the hind femora.

g¹. Tegmina not narrowed in the middle; anal cerci of the male slender, the basal tooth short and weak; tegmina and wings olivaceous brown; size less than medium..... *Campestre*, Blatchley.

g². Tegmina narrowed in the middle; anal cerci of the male swollen, armed within with a strong basal tooth; posterior margin of the lateral lobes of the pronotum strongly sinuate; size greater than medium..... *Glaberrimum*, Burm.

- f². Pronotum short, less than one-fourth as long as the body; tegmina far surpassing the tip of the hind femora and distinctly shorter than the wings.....*Longipenne*, Scudd.
- d². Face with a reddish-brown stripe down the middle; pronotum short, less than one-fourth the length of the body; ovipositor less than one-half the length of the hind femora; body slender.
- e¹. Stripe broadly expanded on the lower half of the face, forming a triangular spot; tegmina brownish-green or testaceous.....*Concinnum*, Scudd.
- e². Stripe not expanding on the lower part of the face; tegmina and wings transparent whitish tinged with green on the principal veins of the lateral field.....*Indianense*, Blatchley
- A². Hind femora armed with one or more small spines on the under side.
- a¹. Tegmina not much longer than the body, generally plainly shorter; ovipositor decidedly curved and never more than 9 mm. long.
- b¹. Face pale, without a narrow median stripe.
- c¹. Tips of the hind femora surpassed by the tegmina.
- d¹. Dorsal stripe present; ovipositor exceeding half the length of the hind femora; pronotum more than one-fourth the length of the body.....*Sylvaticum*, McNeill.
- d². Dorsal stripe absent; ovipositor less than half the length of the hind femora; pronotum less than one-fourth the length of the body.....*Spinulosum*, Red.
- c². Tips of the hind femora not reached by the tegmina, which are decidedly shorter than the body; pronotum considerably more than one-fourth the length of the body.....*Cuticulare*, Serv.
- b². Face with a narrow median stripe*Agile*, DeGeer.
- a². Tegmina considerably longer than the body.
- b¹. Ovipositor not more than 9 mm. long and decidedly curved.
- c¹. All the tibiæ black or infuscated on the upper side; ovipositor plainly more than half the hind femora;

pronotum not less than one-fourth the length of the body ; dorsal stripe present, though frequently obsolete posteriorly *Nigripes*, Scudd.

c². All the tibiae not black nor infuscated on the upper side ; ovipositor distinctly less than half the length of the hind femora ; pronotum less than one-fourth the length of the body ; dorsal stripe wanting *Nitidum*, Red.

b². Ovipositor at least 10 mm. long.

c¹. Hind femora spined only on the outer carina of the under side ; ovipositor nearly straight.

d¹. Tegmina not more than 25 mm. even in the female, much less in the male ; general colour brownish-green ; dorsal stripe bordered by two narrow lines of darker brown . . *Bruneri*, Blatchley.

d². Tegmina not less than 25 mm. long even in the male, much more in the female ; tegmina strongly reticulate ; the anal area forming a distinct angle with the lateral field *Volantum*, McNeill.

c². Hind femora spined on both carinae of the under side ; ovipositor distinctly curved ; dorsum of the pronotum with two reddish-purple stripes ; pronotum less than one-fourth the length of the body . . . *Laticauda*, Red.

ORCHELIMUM DELICATUM, Bruner.

Orchelimum delicatum, Bruner. Ent. News, III., 264, Dec., 1892.

“ *gracile*, Bruner. CAN. ENT., XXIII., 70.

Not “ “ Harr.

This species was re-named by Bruner when he found it necessary to restore Harris's *O. gracile*, which on the authority of Scudder had been considered a synonym of *Xiphidium fasciatum*, De Geer.

It is very limited in distribution, being known only from Nebraska, where, however, Bruner says it is “ quite common in the vicinity of West Point, about the margins of ponds, etc.” He also took it at the electric light in Lincoln.

ORCHELIMUM GLADIATOR, Bruner.

Orchelimum gladiator, Brun., CAN. ENT., XXIII., 71.

" " Blatchley, Proc. Ind. Acad. Sci., 1893.*

Nebraska, "On the flowers of a prairie golden-rod (*Solidago rigida*, L.), at West Point," Bruner; Indiana, "From the borders of a tamarack swamp," Blatchley.

ORCHELIMUM MINOR, Bruner.

Orchelimum minor, Bruner, CAN. ENT., XXIII., 72, Apr., 1891.

Apparently a rare species, known only from the District of Columbia. It is unknown to me and has not been recognized since it was named.

ORCHELIMUM VULGARE, Harr.

Orchelimum vulgare, Harr., Ins. Inj. to Veg., p. 162, fig. 77, 1862.

" " Scudd., Mat. for Mon., 452, 1862.

Xiphidium agile, Red., Mon. der Con., 186, fig. 80, 1891.

It is very probable that many of the references to this insect are mistaken. It seems to range over the northern United States from the Pacific to the Atlantic, and northward for an unknown distance into British America. It is found as far south as Arkansas and Maryland.

ORCHELIMUM GRACILE, Harr.

Orchelimum gracile, Harr., Ins. Inj. to Veg., 1862, p. 163, fig. 78.

" " Brun., Ent. News, III., Dec. 1892, 264.

Not *Xiphidium fasciatum*, Scudd., Mat. for a Mon., 1862, 451.

According to Bruner, Scudder was mistaken in referring *O. gracile* to *X. fasciatum*. Massachusetts, Harris; New Jersey, Bruner.

ORCHELIMUM ROBUSTUM, Red.

Xiphidium robustum, Red., Mon. Con., 185, 1891 New Orleans, Redtenbocher.

ORCHELIMUM CAMPESTRE, Blatchley.

Orchelimum campestre, Blatch., Proc. Ind. Acad. Sci., 133, 1893.

Reported from Vigo and Fulton Counties, "In upland prairie meadows, where it frequents the tall grasses, usually in company with *Xiphidium strictum*, Scudd."

ORCHELIMUM GLABERRIMUM, Burm.

Xiphidium glaberrimum, Burm., Hand., II., 3, 707, 1839.

*The title page of the author's reprint bears the date 1892, but it is evident that this paper was not printed until 1893 or later, as some of the synonymy given bears the date 1893. (See page 135.)

Orchelimum glaberrimum, Scudd., Mater. for a Mon., 453, 1862.

Xiphidium " Red., Mon. der Con., 187, 1891.

The whole United States east of the Rocky Mountains.

ORCHELIMUM LONGIPENNE, Scudd.

Orchelimum longipenne, Scudd., Mat. for a Mon., 453, 1862.

Xiphidium inerme, Red., Mon. der Con., 187, 1891.

Texas, Redtenbocher, Scudder; Kansas, Nebraska, Bruner.

ORCHELIMUM CONCINNUM, Scudd.

Orchelimum concinnum, Scudd., Mat. for a Mon., 452, 1862.

? " *herbaceum*, Serv., Hist. Nat. Orth., 524, 1839.

Xiphidium concinnum, Red., Mon. der Con., 188, 1891.

Blatchley says: "It frequents the weedy and grassy margins of marshes and lowland ponds and reaches maturity about August 15th." Massachusetts, Scudder, Redtenbocher; New York, Beutenmüller; Indiana, Blatchley; Illinois, McNeill; Nebraska, Bruner.

ORCHELIMUM INDIANENSE, Blatch.

Orchelimum Indianense, Blatch., Proc. Ind. Acad. Sci., 137, 1893.

Blatchley says it was "quite common among the rank grasses and sedges about the margins of a tamarack swamp near Kewana, Fulton County, Indiana.

ORCHELIMUM SYLVATICUM, McNeill.

Orchelimum sylvaticum, McNeill, Psyche, 26 Feb., 1891.

" " Blatch., Proc. Ind. Acad. Sci., 136, 1893.

Found on corn and about open places in the woods. Blatchley says: "It frequents the borders of cultivated fields and open woods." Illinois, McNeill; Indiana, Blatchley.

ORCHELIMUM SPINULORUM, Red.

Xiphidium spinulorum, Red., Mon. der Con., 189, 1891. North Carolina, Redtenbocher.

ORCHELIMUM CUTICULARE, Serv.

Orchelimum cuticulare, Serv., Hist. Nat. Orthop., 523, 1839.

Xiphidium cuticulare, Red., Mon. der Con., 189, 1891. Texas, Redtenbocher.

ORCHELIMUM AGILE, De Geer.

Locusta agilis, De Geer., Mem., III., 457. Pl. 40, Fig. 3, 1778.

Orchelimum agile, Scudd., Mat. for a Mon., 453, 1862.

Not *Xiphidium agile*, Red., Mon. der Con., 186, 1891.

There is considerable uncertainty concerning the status of this species. Redtenbocher made *O. vulgare*, Harr., a synonym, but Blatchley points out that Redtenbocher's measurements do not agree with those of *vulgare*. The species as determined by Scudder, as it is represented in my collection, has the under sides of the hind femora spined. Maryland, Illinois, Scudder; Kansas, Nebraska, Bruner; Montreal, Canada, Caulfield; New Jersey, Smith; New York, Beutenmüller.

ORCHELIMUM NIGRIPES, Scudd.

Orchelimum nigripes, Scudd., Ent. Notes, IV., 62, 1875.

Xiphidium nigripes, Red., Mon. der Con., 188, 1891.

The range of this species seems to be from the Rocky Mountains to Indiana, and Texas to Nebraska. It has not been reported east and south of the Mississippi and Ohio.

ORCHELIMUM NITIDUM, Red.

Xiphidium nitidum, Red., Mon. der Con., 189, 1891.

Georgia, Redtenbocher.

ORCHELIMUM BRUNERI, Blatch.

Orchelimum Bruneri, Blatch., Proc. Ind. Acad. Sci., 139, 1893.

This species is apparently closely related to my *O. volantum*, and it may prove identical. Said by Blatchley to be "common on the leaves and stems of a tall, broad-leaved knot-weed (*Polygonum amphibium*), which grows luxuriantly in the shallow waters about the margins of two or three large ponds in the Wabash River bottoms." The same authority reports it from the margin of Lost Lake, Marshall Co., Ind.

ORCHELIMUM VOLANTUM, McNeill.

Orchelimum volantum, McNeill, Psyche, VI., 26, Feb., 1891.

Found only on *Sagittaria variabilis*, in a single locality on the banks of Rock River, Illinois, near Cleveland, Henry County. It makes more use of its remarkably long wings than any other species of the genus known to me.

ORCHELIMUM LATICAUDA, Red.

Xiphidium laticauda, Red., Mon. der Con., 190, 1891.

New Orleans, Redtenbocher.

NOTES ON SOME NORTH AMERICAN VPONOMEUTIDÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

(Continued from page 41.)

Genus GLYPHIPTERYX, Hübn.

Hübn., Verz. Bek. Schmett., 421, 1816; Wals., Proc. Zool. Soc., Lond., 1897, 118.

Synopsis of Species.

Hind wings narrowly oblong, the fringe about as long as the width of the wing.

A series of black and silver dots along the margin of wing at anal angle.

Fore wing with a straight white line across the middle.

A purplish space subterminally, with three white dashes on costa *bifasciata*, Wals.

No purplish space, but a nearly continuous white line beyond the middle line. *unifasciata*, Wals.

Fore wing with a white costal bar at middle, preceded and followed by white lines that converge toward inner margin. *quinqueferella*, Wals.

Fore wing without such spots on the margin.

A curved white streak on middle of inner

margin *impigritella*, Clem.
(= *exoptatella*, Chamb.)

This white streak not curved.

This white streak a triangle without a costal dot opposite it. *circumscripta*, Chamb.

This streak with an opposed white costal streak. *Californiæ*, Wals.

Hind wings broader, the fringe much shorter than the width of the wing.

Fore wing with no costal white streak except at the apex, the other lines being lead colour. *regalis*, Wals.

Fore wing with white costal streaks.

No conspicuous white streak on middle of inner

margin *quadragnetapunctata*, Dyar.

A white streak on the middle of inner margin. *montisella*, Chamb.

G. quadragnetapunctata, n. sp.

Fore wings dark brown, the apex golden; seven yellowish white dots on the costa, the third from the base continued as a white line across the

wing to the inner margin, the fourth an oblique dash crossing the wing about one-third its width; 5th at the end of a curved opalescent line that runs across the wing to tornus; 7th produced as a short opalescent line; 8th as a longer opalescent line that ends on middle of outer margin; disk broadly blackish, thickly filled in with little yellow dots that appear opalescent in certain lights. Hind wings blackish brown, the fringe paler; abdomen white ringed, especially below; legs black spotted outwardly. One female, expanse 14 mm. Onaga, Kansas (F. F. Crevecoeur). U. S. Nat. Mus. Type No. 4424.

Genus CHOREUTIS, Hübn.

Hübn., Verz. Bek. Schmett., 373, 1816.

Synopsis of Species.

Fore wing ochreous at tip..... *inflatella*, Clem.

Fore wing not ochreous at tip.

Fore wing broadly ochreous at base..... *silphiella*, Grote.

Fore wing slightly ochreous at base in streaks or not at all so.

Extreme base of wing dark.

Dark basal space contracted, the middle of the wing filled in by a purplish cloud containing black specks.

This cloud edged by a distinct white

line..... *onustana*, Walk.

Edges of this cloud only a lighter shade of purplish.

Outer edge of cloud irregular, dentate; two ochreous streaks at base... *bjerkanella*, Thunb.

Outer edge of cloud defined by a curved line; no ochreous at base..... *sororculella*, Dyar.

Dark basal space not contracted, occupying half the wing, the pale cloud occupying the terminal half with the black specks segregated into a patch below vein 5.

Basal space crossed by a white line.

This line curved..... *occidentella*, Dyar.

This line straight..... *extrinsicella*, Dyar.

Basal space without a traversing

line..... *Coloradella*, Fern. MS.

Extreme base of wing whitish gray..... *leucobasis*, Fern. MS.

C. inflatella, Clem., Proc. Ent. Soc. Phil., II., 5, 1863; *virginiella*, Clem., Proc. Ent. Soc. Phil., III., 505, 1864.

I cannot distinguish Clemens's two species, described as *Brenthia*.

C. sororculella, n. sp.

Generally similar to *bjerhandella*, Thunb., but without any traces of the yellow dashes at the base of fore wings. The pale gray space in the middle of the wing is sharply limited without and within by a paler line; in the centre of this space is a large group of black and metallic scales; beyond the pale line are no black scales, but a regular, distinct, subterminal metallic line; a subcostal metallic streak in basal space. Hind wings with a white dash as in *onustana*. Two examples. Placer Co., California. June (A. Koebele); U. S. Nat. Mus., type No. 4426.

C. occidentella, n. sp.

Grayish brown; basal half of wing of this colour, with a curved white line across its centre. Terminal half of wing filled, except somewhat narrowly along outer margin, by a large whitish patch, irrorate with brown scales, containing above a small black patch and below a large quadrate one, cut by a whitish line transversely; silvery scales along costa basally, middle of wing, subterminally and in the black patch. Hind wings brown, immaculate. Below a faint, irregular, whitish, submarginal line on hind wings and two costal dots on fore wings. Expanse 14 mm. One male. California (coll. Beutenmüller). U. S. Nat. Mus., type No. 4428.

C. extrinsicella, n. sp.

Light brown, head and palpi whitish. Fore wing with basal half brown, crossed by a broad, straight, white line with a few silvery scales outwardly on costa. Terminal half of the wing nearly white except narrowly along outer margin, streaked above with longitudinal, somewhat cuneate, lines of black scales, below containing a single elongate, rounded, black patch with two groups of silvery scales; similar scales on outer border of white patch; outer half of fringe white. Hind wings pale brown. Expanse 12 mm. One male. Wisconsin. U. S. Nat. Mus., type No. 4427.

Genus THELETHIA, Dyar.

Dyar, CAN. ENT., XXV., 301, 1893; *Thia*, Hy. Edw. (preoc. Col. 1840); Hy. Edw., Ent. Am., III., 181, 1888; Kirby, Cat. Lep. Het., I., 901, 1892.

T. extranea, Hy. Edw., Ent. Amer., III., 181, 1888; Smith, List. Lep. Bor. Am., No. 956, 1891; Dyar, CAN. ENT., XXV., 301, 1893.

I include this genus here tentatively. I have not seen a specimen in six years, and my old notes give only the venation. It may be a Tineid near *Incurvaria*.

FURTHER OBSERVATIONS UPON BOMBYX CUNEA, DRURY, ETC.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

To make my way clear I beg to state the objects I had in view in writing the article that appeared under my name in the number of the CANADIAN ENTOMOLOGIST for last May. They were these :

- I.—To establish the identity of the *Spilosoma Antigone* of Strecker with the *Spilosoma congrua* of Walker.
- II.—To show that Dr. Riley's series of wings in Fig. 87, *Packard's Forest Insects*, does not afford a proof conclusive that *cunea*, *textor*, *punctata* and *punctatissima* are one and the same species of insect.
- III.—To bring into notice a *Spilosoma* which answers to the figure given by Drury of his *Bombyx cunea*.

I.—It is admitted that *Antigone* and *congrua* are identical. I need not say anything more on that point.

II.—I have always looked upon Riley's series of wing-figures with distrust—much as I should regard a catena brought forward by a controversialist to support an erroneous opinion ; and, in the paper I have mentioned, I endeavoured to show the weakness of his position by stating that a like series of wing-figures could be taken from specimens of moths raised from "black ground-feeding larvæ." It has been said "*there is no doubt at all of the identity of all these forms*," and if a positive assertion could have settled the matter, it would have been settled ; but a chain is not stronger than its weakest links, and Sir James Smith *was not sure* of the identity of *punctatissima* with Drury's *congrua*, and Dr. Ottolengui gives voice to a doubt, which others beside himself have felt, and says : "Is it possible that the immaculate and the spotted forms of *cunea* may be distinct?" (By these "forms" I understand him to mean *punctatissima* and *textor*.)

Smith and Abbot give us a picture of their *Phalæna punctatissima*. There is an irregularly spotted male insect, a spotless female, and a larva feeding upon a sprig of mulberry. Quite a fancy sketch ! And this is the description appended :

"Ph. Bombyx elinguis, alis deflexis corporeque niveis nigro punctatis, thorace utrinque lunula nigra."

And under this is a note (the italics are mine) :

"Whether this be the *cunea* of Mr. Drury or not, it deserves a more expressive, or rather a less erroneous, name. The character above given applies to the male only, the female being entirely white."

Now, Dr. Dyar tells us that "Walker knew *cunea*, Drury" (CAN. ENT., v. XXXI., p. 155), very well. What does Walker say about the female of the species? This is what he says: "*Female*—Hind wings with some brown submarginal spots."

There is no warrant whatever for speaking of an *immaculate cunea*, Drury—whether male or female. Drury neither figured nor described such an insect.

I hope it will be understood that when I have spoken of *cunea* I have meant Drury's *cunea*—not the insects that of late have been erroneously called by that name. When I have spoken of moths from fall webworms, I have designated them as such, or I have used the term given by Harris for the northern immaculate insect, and the term given by Smith and Abbot for the southern spotted insect.

Hyphantria textor, Harris, and *Phalæna punctatissima*, S. and A., are supposed to be (though Harris had no idea that they were) seasonal varieties of one and the same species of moth—a moth that comes from the fall webworm.

In Canada we have only one brood of this species in the year, but southward there are two generations of it. Thus Dr. Wm. Saunders writes:

"In the northern United States and Canada there is only one brood of this insect in the season, but in the south it is frequently double-brooded, the first brood of the larvæ appearing in June, the second in August."—*Insects Injurious to Fruits*, p. 73.

And Dr. L. O. Howard writes:

"In the District of Columbia and north to New York City there are two generations annually." * * * * *

"The caterpillars of the second generation begin to make their appearance in force in August."—*Farmers' Bulletin No. 99*, p. 20.

It is, I presume, the moths from this *second* generation that Dr. Ottolengui refers to in his "Contribution, etc.," in the December number of the CANADIAN ENTOMOLOGIST, pp. 358-9.

With his remarks, as to the profuse spottedness of these early moths, agree, in part, the words of Mr. James S. Johnson, who wrote from Frankford, Pennsylvania, in August, 1880, and said:

"Hyphantria textor (Harris) made its appearance in this locality on May 10th, and from that date to the 13th I captured 53 ♂ examples and 10 ♀."

"On June 17th the second brood appeared, and in three days I took 41 ♂ and 10 ♀."

* * * * * * *

"In the first brood every male had the black spots on the primaries, from a single spot on each wing to almost covered, *and in some examples a spot on the secondaries*. In the second brood all were bright, not an example with the least trace of a mark, *the females in both broods entirely white*."—CAN. ENT., vol. XIII., p. 18.

The italics in the above quotation are mine.

Mr. Johnson asked these questions: "Has the first brood, or that which remains over winter only, the black spots? or does *H. textor* alternate?"

As far as my knowledge extends, these questions have not been answered. No one has come forward to say, "From eggs laid by *H. textor* I have raised a brood of *H. punctatissima*," or, *vice versa*, "From eggs laid by *H. punctatissima* I have raised a brood of *H. textor*." If I am mistaken in this I shall be glad if someone will tell me *when* and *where* and *by whom* the statement has been made.

As regards our northern examples of *textor*: I have ten moths (males and females) that I have raised at different times from fall webworms. Not one of them has any appearance of a spot at the base of the second fork of the median nerve, such as is shown in "*f*" of Riley's "Fig. 86," in *Packard's Forest Insects*, and "*a*" in "Fig. 87" of the same work.

The dimensions of the moths that come from fall webworms have been given as follows:

In the New England States—One inch and a quarter to one inch and three-eighths—Harris, *Ins. Inj. to Veg.*, p. 358.

In Canada—One inch and a quarter—Saunders, *Ins. Inj. to Fruits*, p. 73.

In the Southern States—One inch and one-tenth—Howard, *Farmers' Bulletin No. 99* (by figures), pp. 24 and 26.

We must accept the dimensions given by these authorities as reliable. From them it appears that the Southern specimens of moths from fall webworms are smaller than the rest. What the very large moths, that have

been mistaken for and associated with *H. textor*, really are must be determined by further careful breeding.

III.—American Entomological literature is rich in synonyms, and Dr. Dyar seems ambitious to add another to the list (see his "*Correction*" in the January number of the CANADIAN ENTOMOLOGIST).

The following is the description of *Spilosoma prima*, Slosson :

"Size of *S. virginica*, but a stouter insect, body heavier and shorter, scarcely reaching anal angle of secondaries. Primaries sordid white, stained with ochreous, especially along costa and inner margin, and with scattered dots of dark brown. These are arranged almost exactly as in some specimens of the form of *H. textor*, Harris, known as *cunea* and *punctata*. The dots are much heavier and more distinct on costa, and there is a submarginal line very plainly indicated and composed of geminate dots on the venules. Secondaries sordid white. Abdomen thickly clothed with white hairs, through which can be seen the yellow of the body, with dorsal row of black spots. Palpi, coxæ and tibiæ very dark smoky brown, almost black."—*Ent. Amer.*, V., 40 (1889).

And these are some of the points in which this insect seems to differ from the *Spilosoma* taken at Quebec and believed to be the *Bombyx cunea* of Drury :

S. PRIMA, SLOSSON.

Size of *S. virginica*.

Stouter than *Virginica*.

A submarginal line of geminate dots on primaries.

Secondaries sordid white (no mention of spots).

Dorsal row of black spots on abdomen.

Tibiæ very dark smoky brown.

THE QUEBEC INSECT.

Smaller than *S. virginica*.

Not so stout as *Virginica*.

A submarginal line of dashes and streaks on primaries.

Secondaries much spotted, as in Drury's figure.

Five rows of black spots on abdomen (Drury's figure shows dorsal and side lines. The under side of the insect is not figured).

Tibiæ white on the outside, dark brown on the inner.

But supposing *S. prima*, Slosson, were shown to be identical with the insect I have described, that would not prove that *Phalæna punctatissima*, S. and A., is one with *B. cunea*, Drury : it would rather indicate that we have had one more synonym in our literature than we have been aware of.

I do not know that I can say any more on the subjects that we have had under discussion. I trust that I have written with befitting modesty, and that I have given the reasons for my statements with sufficient clearness. After weighing all that has been written, I am convinced that *Hyphantria textor*, Harris, is *not* one and the same with *Bombyx cunea*, Drury, and that the insect I have described as *cunea* more closely corresponds to Drury's figure than any other moth, or any figure or description that has come under my notice.

NOTE ON CYANIRIS PSEUDARGIOLUS OF BOISDUVAL AND LE CONTE.

BY ARTHUR G. BUTLER, PH. D., BRITISH MUSEUM, LONDON, ENGLAND.

In 1782, Cramer described and figured a *Cyaniris* (Pl. CCLXX., figs. D, E), and incorrectly gave the Cape of Good Hope as its locality.

In his "Rhopalocera Africæ Australis," Mr. Trimen described the species from a single example labelled "S. Africa" in the British Museum collection, and stated that this was the only example he had seen. In his later work this species is ignored, Mr. Trimen having evidently satisfied himself that it never came from any part of Africa. On looking up the authority for the locality of the specimen mentioned by Trimen in our oldest "Register of Accessions," I find it entered as "*P. Ladon*, Cram., n., S. Africa?" the locality having evidently been entered on Cramer's authority.

As a matter of fact, Cramer's insect is undoubtedly *Cyaniris pseudargiolus*, which it necessarily supersedes, and our reputed African example is a large specimen of the form *marginata*, rather less suffused than usual on the under surface.

It is always inconvenient to alter the names of well-known and abundant species, but under the circumstances I do not see how it can be avoided in the present instance: it will perhaps have one advantage — as *C. pseudargiolus* is not half so nearly related to *C. argiolus* as it is to the Sikhim species, *C. dilectus*, an inappropriate name is suppressed.

A NEW OAK-GALL FROM NEW MEXICO.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Dryophanta Porterae, n. sp.—♀. Length, $2\frac{1}{2}$ mm.; very dark brown; cheeks, tibiae more or less, tarsi, and antennæ except tips, clear ferruginous; smooth and shining, parapsidal grooves distinct; head transversely quadrate, broader than long; antennæ 13-jointed, 13 a little longer than 11 and 12, 3 about a third longer than 4 (3 about 200 μ , 4 about 150 μ , 13 about 180 μ); scutellum prominent; ovipositor rather long, ferruginous, its apical portion with six rings, counting the apex as one;

wings delicately hairy, marked with blackish, nervures suffused with black, marginal nervure almost but not quite attaining the costa at its distal end; a suffused black cloud beneath the end of the marginal cell, a double one in the apical field, a small and indistinct one beyond the apex of the marginal cell, and a faint cloud on the lower part of the wing.

Gall.—On under side of leaf of *Quercus undulata* (true *undulata*, not *Gambelii*), on each side of midrib, sometimes as many as eight on a leaf; gall a thin-shelled depressed sphere, light ferruginous, rather shiny, smooth, surface microscopically tessellate, basal portion with a thin inconspicuous pubescence.

Hab.—Las Vegas Hot Springs, N. M., Jan., 1900 (*Miss Wilmatte Porter*). Fly emerged Jan. 30. I had taken the galls to be those of *D. glabra*, Gillette, which I found in Wet Mountain Valley, Colorado, on leaves of *Quercus Gambelii*. The fly, however, proves quite different from that of *glabra*, and more nearly allied to *D. pulchripennis*, Ashm., and *D. bella* (Bassett). From both of these it differs by the 13-jointed antennæ; from *pulchripennis* also by its dark colour, from *bella* by the much smaller galls. The only other western *Dryophanta* which has 13-jointed antennæ in the ♀ is *D. nubila* (Bassett), but this has densely hairy galls.

PYRAMEIS HUNTERA, N. VAR. FULVIA.

BY G. M. DODGE, LOUISIANA, PIKE CO., MISSOURI.

Expanse one and six-eighths inches. It differs from the usual form of *Huntera* by its smaller size, its paler colour, and by being more broadly fulvous. The fuscous of the primaries is reduced to a black crescentic line at end of discal cell, a dark costal border and a small patch at apex enclosing the white spots. This apical patch is pale, and is outwardly invaded by fulvous.

The large, somewhat crescent-shaped spot that extends from the costa is fulvous, scarcely lighter than the surrounding parts, and is margined, inwardly, with a narrow black line.

On the posterior half of the wing the usual black marks are much reduced in area.

On the secondaries the costal shades are small and pale. The border is narrow, merely a line of crescent-shaped black spots, sharply defined by an outer fulvous line, beyond which a series of dark spots dot the margin, interrupting the white fringe.

Below much like typical *Huntera*, but paler and showing less blue.

Fulvia appears to be a spring form of *Huntera*, perfectly fresh examples being taken here May 2nd to 12th. It varies slightly in showing more or less of the dusky clouding, but its small size and pale fulvous primaries distinguish it at a glance from typical *Huntera*, in which the apical half of the wing is black.

Mailed February 27th, 1900.

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CONTENTS.

| | | | |
|--|-----|---|--------------------|
| Heath—Captures of Lepidoptera in Manitoba..... | 93 | Elwes— <i>Cyaniris pseudargiolus</i> , B. & L..... | 116 |
| Banks—New North American Spiders..... | 96 | Dyar—Life-history of <i>Margarodes flegia</i> | 117 |
| Hulst—New Species of Geometridæ..... | 102 | Grote—Death of Dr. O. Hofmann..... | 118 |
| Grote—Note on <i>Gortyna erepta</i> | 107 | Lyman—Butterflies from the Yukon..... | 119 |
| Wright— <i>Anthocharis flora</i> | 108 | Grote— <i>Hydræcia stramentosa</i> | 119 |
| Knaus— <i>Cicindelidæ</i> of Kansas..... | 109 | Editorial Notes..... | 108, 116, 119, 120 |

NOTES ON CAPTURES OF LEPIDOPTERA.

BY E. FIRMSTONE HEATH, THE HERMITAGE, CARTWRIGHT, MANITOBA.

A constant succession of surprises has taken place during the year 1899, owing to the absence of species and even whole genera that I have taken in previous years in some abundance, their places being occupied by forms new to me. I thought that the list of Manitoba Lepidoptera by Mr. Hanham, now being published, would be fairly complete, considering the amount of material at his disposal; but my work of last summer, so far as I have identified the result, will add several species to the list, and I have yet a number of specimens, about which I am in doubt, to submit to Dr. J. B. Smith, who has very kindly undertaken the task of naming my new things.

A few *Tæniocampas* appeared at the catkins of the White poplar on and after April 26th, but not in anything like the numbers I have seen in other years. Besides a few *alia*, Gn., I netted one or two *subterminata*, Smith, and *Pachnobia salicarum*, Walk. I had, unfortunately, neglected to provide myself with some molasses and was unable to sugar any trees, and had to make flying shots at my game.

I took *Homoptera minerea*, Gn., on May 24th, at sugar for the first time, in two or three varieties and subsequently rather plentifully.

Acronycta illita, Smith, appeared on May 30th and subsequently. On June 2nd I took a few things at light, including *Smerinthus cerisyi*, and at sugar, *Prochærodes clemataria*, S. & A., of which I took one or two more on the next few nights following.

On June 6th I had a fair take at light of Sphingidæ—*albescens*, *excacatus* and *cerisyi*.

About the 16th the genus *Acronycta* came out strongly, several species coming to sugar, and the genus continued to be well represented for several weeks, some new species being added to my collection, including *revellata*, Smith; *albarufa*, Grote; *leporina*, an Old World species which does not appear in Smith's list (1891); *hastulifera*, S. & A.; *noctivaga*, Grt.; *superans*, Gn.; *modica*, Walk., and *oblivita*, S. & A. *Thyatira scripta*, Gosse, also appeared rather freely.

On the 22nd I noticed a large Sphingid hovering over my sugared trees just at dusk, and netting it, I found it to be *Ampelophaga charilus*, Cram. On subsequent nights I secured one or two more, but it is a most difficult insect to take, as it imbibes the sugar while on the wing, without settling, and darts away on the tree being approached. I have never taken this species at light, nor any other Sphingid at sugar.

On June 24th *Zale horrida*, Hbn., and *Hadena miseloides*, Gn., came to sugar, and a few days later *Diphthera fallax*, Hbn.

On July 2nd, among other things at sugar, I secured my first and only specimen of *Copablepharon subflavidens*, Grt.

The best catch I had at light was on the night of July 5th. In the earlier hours I took *Notodonta dimidiata*, H. & S.; *elegans*, Strk., and *stragula*, Grt.; a *Cerura*, several *Schizura*, *Schinia*, *Eubya*; *Platypteryx arcuata*, Walk.; *Dasylophia anguina*, S. & A., and a few *Arctias* and *Plusias*. From 1 to 2 a. m., on the 6th, *Triptogon occidentalis*, Hy. Ed., was almost a nuisance. I believe if they had only charged together they would have broken my windows. I have to work outside, and defy the mosquitoes, with my lamp inside the glass. I notice that while the other Sphingids, *albescens*, *geminatus*, *cerisyi*, *excacatus* and *myops*, appear from 10 to 11 p. m., *Triptogon* hardly ever shows up till after midnight. I did not take an example of *Cressonia juglandis*, S. & A., which is generally rather plentiful. The genus *Plusia* was very sparingly represented last season. I hardly took any, the most notable catch being a single *precessionis*, which is a decided rarity hereabouts. *Arctias* were not so abundant as usual, but I took several *virgo*, Linn., which hitherto had been represented by a single example in my cases.

About this date several beautiful specimens of *Alaria florida*, Gn., were bottled off the window.

The genus *Mamestra* was well represented at both light and sugar.

My catch included *mystica* and *incurva*, Smith; *Farnhami*, *Dimmocki*, *grandis*, *subjuncta* and *neoterica*, Smith. In regard to *incurva*, Dr. Smith tells me that the specimens in his collection come from New Mexico, but that he cannot see any difference between them and that I have sent. I have another specimen so named which was sent by Mr. Hanham to, I believe, Dr. Smith for identification, but my last example being fresher and brighter, I was not quite certain of it and sent it again. It would appear, therefore, that this species has an extraordinary range—from Manitoba to New Mexico—or that we have here a closely allied and almost indistinguishable species.

The Catocalas were pretty well represented. Though I did not make any addition of species to my collection, I took an "*Aspasia*," Streck; the only one I saw. *Relicta* came out in various degrees of mourning: from "complimentary"—almost white, to the "deepest weeds"—nearly black. *Præclara*, G. & R., was more plentiful than usual, so was *grynæa*, Cram; while *concupens*, *parta* and *briseis* were in normal quantities; *unijuga* was less plentiful.

In the early days of August I took at sugar *Adita chionanthi*, S. & A., which is, I think, an addition to our Manitoban list, and also some of the small pale variety of *Hepialus argenteo-maculatus*, besides the ordinary form, of course on the wing.

The Calocampas, Xylinas, Polia, etc., occurred in about their usual numbers. I also took several *Hadena plutonia*, Sm., and, of course, our *allecto*, Sm.

Dr. Smith tells me that I have sent him a *Nonagria* of a species different to that mentioned in Mr. Hanham's list, being smaller and darker, and also a *Cosmia*, which he has received from the Yellowstone, and which, as yet, is not described and named. The genus *Hydroecia* was poorly represented. Several species are generally taken here pretty freely, including *obliqua*, Harv.; *rigida*, Grt., and *frigida*, Sm., and I have also taken *nelita*, Strk. I have been sending some lately to Mr. Hy. Bird, of Rye, N. Y., and I am pleased to find, on his authority, that what I supposed to be *rutila*, Gn., is really the new species *circumlucens*, Sm. I hope this coming season it may appear in like numbers to some previous years.

The last moth I saw at sugar of any value was on Oct. 10th, when I took a very good specimen of *Eupsephopæctes procinctus*, Grt. With the exception of one or two nights, things did not come at all freely to

lights—always excepting mosquitoes, which were terrible, and very often at sugar the moths were so wild that they would hardly allow me to get near enough the trees to net or bottle them, and as well as I could judge, by the faint light of my collecting lamp, one or two new species in single examples got away from me, and left me lamenting.

Butterflies of all genera were scarce during the year. Even the common prairie species were not so plentiful as usual. The *Blues* were in much smaller numbers. Hardly a *Grapta* came to my sugared trees. I saw very few *P. atalanta*, and not a single *Vanessa californica*, so different from 1898. Even *Antiopa* was scarce. I did not see a single *Pieris protodice*, and the *Pamphilas* belonging to the autumnal species were very scarce.

Throughout the summer, at intervals of a week or ten days, my sugared trees were visited by single specimens of *Scoliopteryx libatrix*, Linn., all freshly evolved from the pupa. With such a wide distribution, in point of time, and irregular appearance, it is a wonder that the species manages to reproduce itself in any number.

Ufeus plicatus, Grt., was not quite so numerous as usual. I have never seen it outside my house, either at light or at sugar, but I have had in some years two or three in one evening commit suicide in my lamps.

When the examination of my captures is completed I purpose sending a list of my novelties for insertion in the CAN. ENT., as supplementary to Mr. Hanham's catalogue.

SOME NEW NORTH AMERICAN SPIDERS.

BY NATHAN BANKS, EAST END, VA.

Sergiolus bicolor, n. sp.

Length, ♀, 8 mm. Cephalothorax and legs pale reddish-yellow, mandibles and sternum scarcely darker, basal half of abdomen pale gray, apical half and spinnerets jet black, the line separating the two slightly convex in front; venter pale gray except the apical two-fifths, which is black, but broadly indented by the gray in the middle. Cephalothorax rather slender, about one and three-fourths as long as broad, plainly longer than patella plus tibia IV., not much narrowed in front, no trace of a dorsal groove. Posterior eye-row plainly recurved, the P. M. E. round, about twice their diameter apart, and about as far from the scarcely larger P. S. E. Anterior eye-row much shorter than posterior, nearly straight, the A. M. E. slightly smaller than P. M. E., more than their diameter

apart, and rather nearer to the slightly larger A. S. E., several stiff black bristles in eye-region. Mandibles stout, hardly porrect, with many long, stiff, black bristles in front; palpi with many stout bristles, especially toward tip and on the under side; legs short and stout, metatarsus I. much shorter than tibia I., with but few hairs; three black spines above on femora I. and II., none below on tibia I., one pair at tip below on tibia II., two pairs below on metatarsi I. and II., one pair near base, other at tip; hind legs with more spines on tibiæ, one above near base. Sternum narrow, broadest in middle, pointed behind. The abdomen is about twice as long as broad, rather rounded at base and pointed at tip, slightly depressed, spinnerets prominent; epigynum small, in a reddish area, showing two circular cavities connate on the middle line, each opening behind into a dark cavity beneath the surface.

Covington, Louisiana; May. (Hugo Soltaw.)

Callilepis insularis, n. sp.

Black. Resembling *C. pluto*, Bks., but legs paler (rather yellowish-brown), the two rows of eyes closer together, the P. M. E. oval and not half their diameter apart, A. M. E. smaller and about their diameter apart, closer to the A. S. E.; sternum rather longer than broad, narrowed in front and pointed behind; abdomen depressed; no spines under tibia nor metatarsus I., many on hind pairs; epigynum very different from *C. pluto*; a cavity rather longer than broad, slightly indented on each posterior side, and divided by a septum, narrow at base and twice as broad near tip; the tip not quite reaching hind border of cavity; each side of the cavity at base is a dark line with the tip recurved toward the middle. Length 6.5 mm.

Two specimens from Guadeloupe Isle, off California; June, 1897. (Leland Stanford, Jr. Univ. Coll.)

Euryopsis 5-maculata, n. sp.

Length, ♀, 2.7 mm. Cephalothorax black, palpi black, sternum rather paler in the middle, mandibles yellowish, black on tips, legs pale yellowish, with black stripes on each side of anterior coxæ, and a black stripe on fore side of femora I., II., and III., and on apical part of IV., and on hind part of patellæ and tibiæ III. and IV.; abdomen black above and below, rather paler in middle of venter, and a pale spot on region of epigynum; above are five clear white spots: one on each anterior side, one each side near middle of length, and a median one at tip just above spinnerets, all subequal in size. Cephalothorax one and one-fourth times

as long as broad, sides rounded, head high, projecting over clypeus; eyes subequal, posterior eye-row recurved, P. M. E. one and one-half their diameter apart rather farther from the equal P. S. E., A. M. E. smaller, about twice their diameter apart and scarcely so far from the barely larger A. S. E., which latter are only slightly separated from the P. S. E., the A. M. E. are in the upper anterior margin of the elevated head; mandibles small, weak, slightly divergent; palpi large and hairy, last joint heavy; maxillæ including labium; sternum convex, broadest at middle, truncate between hind coxæ, legs of moderate length, IV. pair longest, no spines, but with many scattered stiff bristly hairs, one almost spinelike, erect near tip of patellæ; tibia III. scarcely longer than patella III.; abdomen nearly twice as long as broad, rounded at base, pointed behind, convex above, and with many scattered pale hairs. Two specimens of this very pretty and distinct species: one collected by Mr. Pratt in April, at Washington, D. C., is not quite adult; the other taken at Falls Church, Va., in June.

Coleosoma floridana, n. sp.; *C. blanda*, Keys., nec Cambr.

This is very evidently not Cambridge's species, which has a shorter cephalothorax, more prominent clypeus, differently marked abdomen, less constricted, and the palpus is different. Otherwise it is similar. Keyserling's description is very good. It would seem very strange for a spider to be described from Ceylon and then recorded from Florida without being known from any other tropical regions. One male was collected by Mrs. A. T. Slosson in Florida.

Argyrodes floridana, n. sp.

Length, 2.6 mm. Cephalothorax dark brown; mandibles pale at base, blackish towards tips; palpi black, except pale tips; sternum blackish; legs pale uniform whitish; abdomen blackish, jet black around spinnerets, paler above; cone pale. Cephalothorax of moderate length; eyes scarcely elevated; clypeus sloping; palpi enlarged; sternum convex; legs slender, of moderate length; abdomen very high at base, continuing nearly straight back and at tip with a prominent blunt-pointed cone behind, vertical to the spinnerets; abdomen one and one-half longer than broad, higher than broad.

One female from Punta Gorda, Florida. (Mrs. Slosson.) Readily known by shape of abdomen, dark coloured abdomen and pale legs.

Crustulina borealis, n. sp.

Length, ♂, 1.8 mm. Similar to *C. sticta*, but the abdomen wholly

black, the size smaller, and the femur of palpus less swollen at tip, the two projections of the tarsus are more equal than in *C. sticta*, the P. M. E. are about their diameter apart, the small conic elevations under femora I. and II. are not as large as in *C. sticta*.

Two males from Washington State, Olympia. (Trevor Kincaid.)

Our four species of this genus may be tabulated as follows:

1. Silvery spots on dorsum, cephalothorax reddish.....*guttata*.
No silvery spots, cephalothorax nearly black.....2.
2. Abdomen yellowish, metatarsi and tarsi dark.....*lascivula*.
Abdomen darker, legs uniform pale.....3.
3. Abdomen reddish.....*sticta*.
Abdomen black.....*borealis*.

Philodromus inaequipes, n. sp.

Length, ♀, 3 mm.; femur II. 1.5 mm. Cephalothorax pale yellowish, on sides more brownish, abdomen grayish white, near tip on each side is a short red-brown stripe. legs and palpi pale, there is a black line on the posterior under side of the coxæ, femora and tibiæ of legs I. and II., on both sides of leg III., and on the anterior under side of leg IV. The P. M. E. are nearer to the A. S. E. than to any other eyes. The sternum is very wide in front, and the hind coxæ widely separated. The legs are very long, especially the second pair. The abdomen is about one and one-half times as long as the cephalothorax; the sternum is very wide, and almost as wide in front as anywhere, hind coxæ separated by half their length; femur II. longer than the cephalothorax; legs very long; body and legs closely pilose. Washington, D. C. Separated from our other species by black lines on legs, broader sternum, and longer legs, especially the second pair.

Runcinia californica, n. sp.

Length, 5.5 mm.; tibia plus patella I., 4 mm. Cephalothorax dull yellowish, with an even straight brown stripe each side and a narrow median one reaching only to end of pars cephalica, all connected through the eye-region, but the ridge under the S. E. is white; clypeus with a brown spot each side connected to a stripe that runs down the outer side of each mandible and covers its tip; legs pale yellowish, leg I. with an oblique mark at tip of femur, an apical band on patella, basal and apical bands on tibia and a preapical band on metatarsus, brown; leg II. with the under side of femur brown, otherwise as leg I.; hind legs unmarked; sternum yellowish. Abdomen yellowish, with

a brown stripe on each anterior side, and a pair of brown stripes above, which are widely separated in the middle, but united at either end; these on the posterior sides throw off oblique marks running down the sides; venter pale, with a brown mark before spinnerets. Femur I. much longer than cephalothorax, which is about the length of tibia I.; eight pairs of spines under tibiae I. and II., pairs under metatarsi I. and II. The M. E. form a quadrangle barely, if any, higher than broad. The epigynum shows a small cavity, truncate in front, broadly rounded behind, and divided by a septum.

Los Angeles, California. (Davidson.)

Epeira arizonensis, n. sp.

Length, 4.2 mm. Pale yellowish, nearly uniform, the abdomen more whitish yellow, no marks on the legs or anywhere else. The abdomen is nearly as broad at basal third as it is long; in the ♂, however, much narrower. The base is broadly rounded, and the angles rather prominent, but not humped. Seen from the side it is evenly rounded to the spinnerets. The epigynum has a rather broad and short finger, upturned at the tip, each side is an oval cavity uniting on the middle. The male tibiae I. and II. have two pairs of long spines beneath and an apical short pair, the tip is not curved or thickened.

Arizona. (Townsend.)

Acrosoma maculata, n. sp.

Length, ♀, 5.2 mm. Cephalothorax uniform dark brown, about twice as long as broad, broadest in middle, about as broad in front as behind, a depressed furrow slightly before the middle; legs of moderate length; femur I. a little shorter than cephalothorax, legs yellowish, tibiae, patellae, and apical half of femora I. and II., dark brown, on hind legs a brown ring on tips of femora, patellae, tibiae, and metatarsi; abdomen about twice as long as broad, sides slightly convex, but hardly twice as broad in middle as at base; at basal third above is a small conical hump or spine each side; at apex are four conical spines, the superior pair semi-erect, not divergent, the inferior pair directly below superior pair, shorter, horizontal and scarcely divergent. Abdomen black, marked with yellow spots, a double spot each side at base, followed by four spots in a row on each side, the apical spot being larger and having an extension upon the outer side of the superior spines; between the sub-basal humps is a pair of yellow spots, and behind them a median one transverse, toward the apex is a pair between the third of the lateral row, and between the bases of the

superior spines is a yellow mark ; the sides have small yellow spots, and on the venter there is a curved row or stripe each side, which unite beyond the spinnerets ; sternum brown.

Arizona. (Townsend.) Easily distinguished from any of our other *Acrosomas*, but nearly allied to *A. mitrata*, Hentz.

Habrocestum signatum, n. sp.

♂.—Length, 4.5 mm. Cephalothorax brown, clothed with red hair on clypeus, gray on eye-region, on side margins, and on each side behind leaving a median nearly black stripe. Abdomen clothed with gray hair above, with a curved brown stripe each side uniting at apex, and near there connected by several faint dark chevrons ; near base is a median diamond-shaped dark brown mark, touching each stripe. Legs pale yellowish, a dark spot at tip of the patella, leg I. more reddish, the femora with several bunches of short black hair on under side near tip, nearly fully the length under the patella and tibia, on latter broad and heavy, especially at base, where there are black scale-like hairs (no bunch above on tibia as in *H. hirsutum*) ; elsewhere the legs are clothed with long white hair. Patella III. not modified, but nearly as long as tibia III. Under side of body clothed with gray hair. The spider, when dry, has a general hoary appearance. The female which appears to belong to this species is 6 mm. long ; it has a dark cephalothorax clothed with gray and yellowish hair ; clypeus white with a white fringe on margin and over eyes ; legs pale yellowish, darker on outside of tibiæ and metatarsi ; dorsum of abdomen dark brown, a median pale irregular stripe on posterior half, and each side the pale runs up in an oblique manner ; venter pale. The palpus of male much on the style of *H. hirsutum*, but with the stylet not near as long and the projection from tibia more acute ; at base there is a stiff bristle-like projection or hair, which lies across the base of the bulb.

Los Angeles, Calif. (Davidson.)

Scius cinctipes, n. sp.

Length, 3.7 mm. Cephalothorax black, two large oblique red-brown spots behind the eye-region, nearly touching on the middle line, clothed above with white hairs, more yellowish in front ; mandibles yellowish brown ; legs yellowish, banded most distinctly from below with brown ; one on anterior femora, two on hind femora, one on patellæ, one on tibiæ, two on metatarsi, and one on hind margin of hind coxæ ; palpi also banded. Abdomen pale grayish, with many brown spots of irregular

shape, a median brown stripe, interrupted at posterior third, with two projections each side, the posterior one often connected to the side markings; on the posterior third the abdomen is mostly brown, with a few pale chevrons; sides brown, with rows of pale dots; venter pale, with brown spots and a brown central stripe; superior spinnerets brown, others pale; sternum pale, dark on sides. Cephalothorax low and flat, projecting over the mandibles, about one and one-fourth times as long as broad, broadest slightly behind dorsal eyes; eye-region a little broader behind than in front, one and three-fourths times as broad as long, occupying about two-fifths of the cephalothorax; M. E. very large and nearly touching; S. E. well separated from them and a little above, dorsal eyes equal to S. E., those of second row a trifle nearer to S. E.; legs short, femur I. very stout, IV. pair longest and most slender, metatarsus I. no longer than tarsus I., three pairs of spines under tibiæ I., one under metatarsus I., fore coxæ separated by width of lip; sternum pointed behind, about twice as long as broad. The epigynum shows a cavity twice as broad as long, evenly convex behind, biconcave in front, the sides pointed. Baton Rouge, Louisiana; May. (H. Soltaw.)

SOME NEW SPECIES OF GEOMETRIDÆ.

BY GEO. D. HULST, BROOKLYN, N. Y.

Tephroclystis plumbaria, n. sp.

Belongs to the *absinthiata* group, and is close to that species. Of a blackish fuscous colour, wings broad and rounded, lines faint, parallel with outer margin, evenly scalloped, the outer one most distinct and whitish. Costa with small black spots at beginning of the lines; discal spots on fore wings black, lengthened, on hind wings black points. Beneath lighter, smoother, the lines showing more evenly, more broadly and lighter. Dist. of Columbia, taken July 5th. Type number, in National Museum, 4701.

Tephroclystis Bolterii, n. sp.

Expands 21 mm. Palpi porrect long, heavy, dark fuscous; front dark fuscous; thorax fuscous gray; abdomen dark fuscous; fore wings narrow, pointed, light gray, somewhat fuscous, stained with a number of indeterminate wavy darker parallel cross lines, these showing more clearly at costa; discal spot black, lengthened, with black dash above on costal vein; three black dashes outside, beyond cell; median vein black lined and connecting with discal spot; an extra discal cross line of venular

black dashes, and indications of cross lines along inner margin; discal spots faint; beneath nearly colour above, fore wings with fuscous shadings along costa and on anterior half, the hind wings with corresponding shading on anterior margin.

Texas; from Mr. A. Bolter.

Tephroclystis lachrymosa, n. sp.

Expands 24 mm. Palpi short, light; these, with front, thorax, and abdomen, blackish fuscous; wings broad, rounded, loosely scaled, dark sordid fuscous, very slightly broken into indeterminate lines; two or three lines of short black dashes across fore wings, beyond cell, and a pretty clear submarginal white line parallel with the outer edge; discal spots diffuse, black; hind wings lighter basally; discal spots faint, blackish; beneath lighter fuscous, the colour above showing brokenly on costa and apex of fore wings, and outwardly on hind wings, there showing in rounded lines; discal spots black.

Oregon.

Tephroclystis plenascripta, n. sp.

Palpi very short; these, with front, thorax, and abdomen, light gray; the abdomen much darker on the two anterior segments; fore wings overlaid with black scales running into groups of parallel lines, those basally rounded, angulate, not very distinct, the middle ones with a sharp, strong angle at discal point, another inwardly at median vein, then outwardly at vein 2, and then wavy to inner margin; outer space with lines subparallel with margin; the veins black pointed, with two whitish lines, the inner smooth, broadish, the outer finer, subdentate; discal spots distinct, black; hind wings with darker scales outwardly and along inner margin, the lines showing on inner space; discal spots faint; beneath fuscous to light gray, the lines showing more broadly, especially on anterior half of fore wings.

Yellowstone Park, Wy., July 8-15. National Museum, type No. 4702.

Tephroclystis tenebrescens, n. sp.

Expands 28 mm. Much like preceding species, palpi longer and heavier, and the insect considerably larger; colour more even fuscous gray, with a slightly brownish tint, with lines, except submarginal white line, less distinct, and only indicated by dark shadings on veins; submarginal line quite distinct, whitish, evenly scalloped between the veins; hind wings concolorous with fore wings, the lines indicated only by

shadings ; all discal spots present, black ; beneath fuscous gray, even, an extra discal cross line, rather broad, showing on hind wings ; discal spots present, black.

Texas.

Philereme nigrescens, n. sp.

Size and general form of *P. californiata*, Pack., but with fore wings of a clear even black gray, two cross lines of extra discal whitish venular dots, and a broken submarginal scalloped white line ; hind wings blackish gray outwardly, becoming lighter basally ; beneath even dark blue-gray, a broad, slightly lighter line extra discally on hind wings.

Oregon.

Hydriomena amorata, n. sp.

Size and lines very much as in *H. custodiata*, Guen. The fore wings, however, are more pointed, the hind wings somewhat wavy edged, the middle band of the fore wings with a reddish shading, becoming in some specimens bright reddish brown ; beneath very light, the cross band hardly showing except at costa, the apex shaded with reddish brown, the hind wing black, shaded outwardly with indistinct lines.

S. California.

Cænocalpe cænonymphata, n. sp.

Expands 25-28 mm. Front and antennæ fuscous brown, the thorax and abdomen lighter ; palpi short, rather stout, fuscous brown, blackish on end ; fore wings fuscous brown on anterior half, fuscous ochre on posterior half and basally, the colour of the costa broken by three spots of the posterior colour, the outer continued in a broad cross line with the posterior colour, enclosing a subquadrate darker space, the line or band apparently returning around the spot to costa. Apex dark, in triangular shape ; hind wings fuscous ochre, a shade darker basally on first third, showing the darker under side ; beneath fore wings marked as above, but darker, the broad outer line rectangularly bent at vein 4, the posterior angle being fuscous ochre, the costa being marked with reddish brown ; hind wings very much darker than above, with broad light coloured cross lines at middle, nearly white, with rectangular sinus outward below discal spot, which is large and whitish ; outer half mixed with reddish ; marginal space rather lighter.

Pasadena and Yosemite Valley, Cal. Very closely resembling in general appearance some forms of *Cænonympha ochracea*, Edw.

Synelys pergracilis, n. sp.

Expands 29 mm. Fore wings rusty white, basal line black, sinuous, distinct, beginning about one-third length of wing out, running very obliquely to near base on inner margin; middle field dull white; discal spot pure white, oval; outer field brown, less so towards apex; outer line black, sharp, unevenly sinuous, very oblique; this is followed by a light, even, rather broad, and another submarginal light line, evenly and regularly scalloped; a row of marginal black points; hind wings corresponding with fore wings in lines and colour, the basal line very close to base, the outer black line beyond discal point; on both fore and hind wings the outer black line is edged with reddish outwardly; beneath light ochreous, the fore wings stained somewhat with fuscous.

South Florida.

Eois Crossii, n. sp.

Expands 16 mm. Head and thorax in front, yellow; thorax behind, and abdomen, reddish violet, the abdomen interlined with yellow; fore wings reddish violet, base and costa yellow, the basal part mixed with violet, the wings crossed with three faint irregular tremulous and angulate lines; hind wings reddish violet, with lines as in fore wings; beneath, reddish pink.

Florida; from Mr. Edward Winslow Cross, in whose honour I name this insect.

Eois purpurascens, n. sp.

Expands 15 mm. Fore and hind wings of a bright rust colour, the outer margins with a broad band, purple in colour, somewhat broader at apex; the wings are crossed by about three faint indeterminate cross lines of a deeper red or red-purple colour; the fore wings have the basal half of costa yellowish, the base being purple; thorax yellow; abdomen purple.

Cocoanut Grove, Fla. National Museum, type number 4699. The head and part of the abdomen of the type are gone, but the wings are fresh and clear, and the insect is a very distinct one.

Nemoria Dyarii, n. sp.

Expands about 16 mm. Front and collar orange red; thorax green, yellowish behind; abdomen yellowish, washed with violet red above; wings deep yellowish green, on anterior and outer margins edged with reddish violet, the costa and fringes being of this colour; the fore wings have indications of cross lines basal and outer, these faint, broken and

irregular; corresponding lines also indicated on hind wings; beneath, much lighter yellowish green, the edges of the wings reddish, the base of fore wings also washed with the same colour. Either from L. I., N. Y., or from Dist. Colum.; collection of Dr. H. G. Dyar, to whom I dedicate it. National Museum, type No. 4700.

Cymatophora evagaria, n. sp.

Expands 26-29 mm. Head, thorax, and abdomen light ochre, the abdomen more yellowish; fore wings light ochre washed with fuscous, this being heavier on the outer third; costa very much rounded, especially at apex, outer edge falcate; faint indications of cross lines, three in number, showing especially in fuscous at costa; hind wings light ochre, slightly fuscous washed; beneath as above, the markings more decided, and lines faintly showing on hind wings.

Wis., Minn., Ont.

Selidosema delicatum, n. sp.

Expands 38-40 mm. Palpi smoky; front and thorax light ochre or dull white; abdomen dull white with black scales intermingled; fore wings light ochre, with scattered black scales, these thickest basally, and outwardly forming two broad, uneven bands, the outer one with three sinuses outward; an indeterminate submarginal band parallel with margin; hind wings like fore wings, but lacking the basal band; the outer band on all wings has a violet tinge; beneath dull white, the markings above reproduced, but less distinctly.

In a female before me, the markings on the wings are somewhat more distinct and pronounced than in the ♂; the submarginal line is blackish, dentate, quite distinct; it is also considerably darker on the under side.

Wilson's Peak, Cal., Sept. 26; from Mr. Kemp.

Therina lugubrosa, n. sp.

With the lines and size of *T. fervidaria*, var. *somniaria*, Hulst., but of an even, dark, soft, smoky, fuscous colour, the middle field somewhat lighter, the lines scarcely darker than the ground colour, the inner inwardly and the outer outwardly edged with light ochre colour; beneath nearly the same colour, but more indistinct.

Rossland, Brit. Colum. I have a number of specimens which are quite uniform. It is quite likely, however, it may be ultimately found to be a variety of *T. fervidaria*, Hubn.

Therina leta, n. sp.

Expands 27 mm. Smaller than any other *Therina*, the colour very nearly the shade of *T. fiscellaria*, Walk.; inner line straight, the outer angled below costa; hind wings with line straight; fore wings even on outer margin; beneath lighter, unicolorous.

N. Mex.

Stenaspilates albidula, n. sp.

Expands 38-40 mm. Very much in lines like *S. Meskearia*, Pack., but ground colour nearly white, and other markings very much lighter, and the insect is considerably larger; the margins of the wings differ in being almost entirely even in outline.

Colo., N. Mexico. National Museum, type No. 4698.

Caberodes subochrearia, n. sp.

Expands 42 mm. Much as *C. confusaria*, Hubn., in ground colour, but with reddish brown cross lines, the basal evenly rounded, the outer angled at costa, then straight to inner margin, nearly joining the basal line there; a single line on hind wings, this being a continuation of the basal, not the outer line; beneath more reddish brown, the outer line present on fore wings, this being doubled at costa; the line of hind wings wanting; discal spots present above and below on all wings.

New Jersey; from Mr. Kemp. I have the female only, so the generic determination may not be correct.

NOTE ON GORTYNA EREPTA.

BY A. R. GROTE, A. M., HILDESHEIM, GERMANY.

This species was described from material collected by Prof. Snow in Douglas Co., Kansas, and the type is in Coll. British Museum. It is now suspected that *Gortyna erepta* may be the same species with *Hydracia lunata*, and it is to be regretted that an opportunity of examining the type in British Museum Coll. has been passed over. The appearance of the reniform is characteristic in this genus. In *erepta* it is described as "small, a white half-moon in a blackish shade." In *lunata*, "narrow, white oblique lunule, margined by black scales." The reniform spot thus seems to be identically described in both cases. In *erepta* the lines are described as fuscous, simple. In *lunata* as single and whitish. I never saw a noctuid in which the lines were white or paler than the wing, but there is a following pale shade which sometimes persists when the dark line itself becomes obliterate. It seems as though this discrepancy

might be explained away. In the Revised Check List of 1890 the position given to *erepta* is about the same with that accorded elsewhere to *lunata*. In the Washington Catalogue it is doubted whether all the species referred to *Gortyna* or *Hydracia* really belong there; but this doubt is greatly dispelled by the recent revision of *Hydracia*, in important part, from Mr. Bird's material and correct determinations. The species are all referred to *Hydracia*, but the doubt is retained alone for the unidentified species *erepta*. But if now *erepta* were the same species with *lunata*, the doubt must ultimately disappear, while in being able to refer *erepta* as a synonym to *lunata*, a difficulty for the revisionist could be finally removed.

ANTHOCHARIS FLORA.

On page 283 of Holland's Butterfly Book, as to *Anthocharis Flora*, are written the words, "The plates give figures of the types." This is an error. No Eastern man ever saw the types. They are now, and always have been, in my cabinet, and never were out of my possession a moment, and, moreover, have never been copied or figured. At the time I published *Flora*, I sent a pair to Dr. Scudder, and another pair to Mr. W. H. Edwards, typical perhaps they might be called, and these latter are doubtless the ones copied by the Rev. Dr. Holland; but as *Flora* is quite constant as compared with some other members of the genus, the error may be of technical rather than serious importance.

W. G. WRIGHT, San Bernardino, Cal.

We beg to offer our hearty congratulations to MISS ELEANOR A. ORMEROD upon the distinguished honour that has been conferred upon her. In recognition of her eminent services in Economic Entomology, the University of Edinburgh has offered her the degree of LL. D. This distinction is the more remarkable inasmuch as it is the first time in its history that this University has bestowed a degree upon a woman. Certainly they could not have broken their ancient traditions in favour of a more deserving person. No one in Great Britain has done more useful and important work for the benefit of the whole community, and has laboured more unselfishly for the good of others, than our greatly esteemed friend Miss Ormerod.

ERRATUM.—Page 87 (March, 1900), 12th line from bottom, for *congrua* read *cunea*.

THE CICINDELIDÆ OF KANSAS.

BY WARREN KNAUS, McPHERSON, KANSAS.

One of the most popular families among the *Coleoptera* to the student and collector is that of the *Cicindelidæ*. Generally bright coloured and handsomely marked, quick to take flight and rapid runners, it requires some skill and considerable patience to become a successful hunter of the "tiger" beetle. Their capture is generally attended with considerable personal discomfort, as their favourite haunt is the muddy bank of a stream, the hot sand bar or dune, or the burning flat of a salt marsh, from which the noon-tide breezes on a July or August day seem to remind one of the temperature of the home of the evil-doer in the here-after. It is in the hottest part of the day, from 10 a. m. to 3 p. m., that most species of this family appear in the open.

The first collector of Kansas tiger beetles was undoubtedly that notable entomologist, Thomas Say, who crossed the plains of Kansas in 1822 or 1823. At the base of the Rocky Mountains he found a single specimen of the noblest "tiger" of them all, which he afterwards described as *Amblychila cylindriciformis*. For the past twenty-five years, or from 1873 or 1874, the homes of the Kansas tiger beetle have been despoiled by such noted collectors as Cooper, Williston, Snow, Brous, Popenoe, Dyche, Ashton, and others of lesser fame, not to speak of the eastern collectors who have ranged over the State along the lines of the principal railways.

In his paper on the "Habits of the American Cicindelidæ," Mr. H. F. Wickham, of Iowa City, Ia., refers to the Kansas collectors as follows: "Perhaps the tiger beetles of Kansas and the adjacent States have received more biographical attention than those of any other portion of the continent, and we find articles treating of their lives from the pens of Profs. Snow and Popenoe, Dr. Williston, Messrs. Cooper, Brous, Knaus, and Jones." My own collections in this family began in 1880, and each year has added to the knowledge of specific habits and haunts.

That Kansas, with her wooded streams, undulating plains, wide stretches of sand and bare saline deposits, is the favourite resort of the *Cicindelidæ*, is shown by the number of species and their varieties in the cabinets of Kansas collectors. In my own collection are thirty species and varieties, all from well-authenticated Kansas localities.

First on the list comes *Amblychila cylindriciformis*, Say, from the clay bluffs south-west of and near Wallace. This large and very desirable

species was first taken in this locality in the summer of 1876, by Dr. S. W. Williston and H. A. Brous, then members of a Yale College Geological Expedition. The following season several hundred specimens were taken by Prof. Snow and his party of the State University, and distributed to the entomological cabinets of America and Europe. This species has not since been taken very abundantly. I have visited this locality about July 1st for two or three seasons, and found about a dozen specimens. The best results in collecting can be had in the early part of a warm, still evening. By the light of a lantern they can be found walking near the base of or along the sides of clay banks. They are seldom seen before sunset in the evening or after sunrise in the morning. But few specimens of this species have been taken outside of Wallace and Gove Counties. Prof. F. W. Cragin, then of Washburn College, Topeka, Kansas, reported finding one dead specimen in the upper valley of the Medicine Lodge Creek, near Sun City, Barber County. From my observations in this locality, it is doubtful if additional specimens will ever be found there.

Tetracha virginica, Linn., is found in Eastern, South-eastern, Central and South-western Kansas. I have taken it during July in the southern part of Woodson County, and in the same month in Republic County; and in Rice, and Barber Counties in August, and in Saline County in July. It is found under stones in dried-up watercourses, in mud cracks, in sloughs and draws during the day, and in the early evening it can be found running over the ground, being crepuscular in its habits.

Cicindela Belfragei, Sallé, is found in the valley of the Smoky Hill River, near Salina, and in the Kansas Valley, near Manhattan. I first took it in a sod cornfield on first river bottom six miles south-east of Salina, about July 15th. I found the best time to collect was mid-afternoon. On coming near the insects they would break from cover and run rapidly, but could be easily taken by the hand. Later in the evening they could be found running along sandy roads near the river bank. The species is not at all common, a dozen specimens constituting a successful afternoon's work or catch. Prof. E. A. Popenoe has taken this species on bottom land near Manhattan, and it has also been taken near Lawrence.

C. cursitans, Lec., has been taken by Prof. Popenoe in the Republican Valley in Clay County. It is ant-like in size and is a difficult species to collect.

C. obsoleta, Say, occurs in South-west Kansas. I have a single specimen, taken August 12th, about twenty miles south-east of Coolidge.

Prof. Popenoe has taken it near Meade, Kansas, and Geo. F. Cooper records it near Sargent (Coolidge).

The green variety, *C. prasina*, Lec., is associated with *obsoleta*, both occurring sparingly.

C. scutellaris, Say, occurs on sandy ground and sand dunes from Manhattan to the western part of the State. I have taken it sparingly at Manhattan in June, but have found it most abundant in the range of sand hills near Medora, Reno County. It can be found from May the 1st to the middle of June. It is a handsome little species, flies quickly and affords good sport to effect its capture. It prefers scant vegetation to the bare sand, and can be found from 10 a. m. to 4 p. m.

The variety *Lecontei*, Hald., I have found associated with *scutellaris* on sand patches near Manhattan and in sand "blow-outs" on the Republican River, south of Superior, Nebraska. I also took two or three specimens among the sand hills near Medora. They are rather shy and are not common.

C. pulchra, Say, is reported by Prof. Williston as being exceedingly abundant in South-west Kansas, and also along the line of the Union Pacific Railway from Hayes to Wallace. I found one specimen near Coolidge on July 27th. It is the only one I saw in a day's collecting. Prof. Popenoe has taken it near Wallace in July, but in several seasons' collecting there I have never seen one alive; have, however, seen the remains of two or three dead specimens under cattle chips. I am inclined to think if it is abundant it is in the months of May or June, August or September.

C. sexguttata, Fab., is reported by Prof. Popenoe as being common in Eastern Kansas, frequenting sunny roads and paths in woodlands. I have never taken it in Eastern Kansas, and his reference is principally to the variety *violacea*, Fab., which is without spots and is generally green, although some specimens are a deep blue. It can hardly be said to be common, and is rather difficult to capture owing to its occurrence along wood roads and paths. I have taken it sparingly at Manhattan, and a friend at Onaga, north-east of Manhattan, takes from ten to fifty each season, from May to July. I have also taken a few specimens near Benedict in South-eastern Kansas in June. The present season my friend, J. R. Meade, of Wichita, sent me a beautiful specimen which he took July 7th in a willow thicket just south of the city. This is probably the south-western limit of this species in Kansas. A. W. Jones, of

Salina, has taken one specimen of *sexguttata* a few miles south-east of Salina, near the Smoky Hill River.

C. purpurea, Oliv., is found over Eastern and Central Kansas, along clay and red sandy roads. I have found it in South-east Kansas at Manhattan, Kansas, and near Salina; at the latter place in August and September along roadside cuts through a red sandstone soil. It is usually associated with its variety, *splendida*, and an occasional *Audubonii* and *graminea*. The black variety, *Audubonii*, Lec., is found but sparingly with the true species. In all my years of collecting I have found but a single specimen. That was taken in the latter part of August, about five miles north of Salina. Prof. Popenoe has a few specimens taken near Manhattan, and A. W. Jones has two or three taken south-west of Salina a few miles. The green variety, *C. graminea*, Schaupp, is apparently as infrequent in this State as *Audubonii*. I have taken but a single specimen that can be recognized as *graminea*. It is a male and was taken near Salina. A. W. Jones has also taken a few *graminea* in this locality. Persistent yearly collecting along the eastern outcrop of the Dakota sandstone formation in Central Kansas may in the future develop localities where these two varieties may be taken in comparative abundance.

The variety *splendida*, Hentz, I have found in Wilson, Saline and Reno Counties, and Popenoe has collected it in Riley and Shawnee Counties. I have taken it near Salina as early as February and as late as October. Localities are the same as for *purpurea*, and usually associated with the typical species, but more abundant. Have found a single specimen only in Reno County, on a dry sand dune, associated with *scutellaris*.

C. formosa, Say, occurs from Central Kansas westward in Arkansas Valley and northward in Republican River Valley. I have taken it in May west of Brockville and in Saline County, south of Superior, Nebraska, in the latter part of May and in the first of June, and in Reno County in May and the first of June. Its favourite breeding ground is in the scant grass and weeds near the edges of sand dunes and "blow-outs." It has to be approached with care and handled quickly, as it takes alarm easily and is a strong flier. In Saline County it was associated with *scutellaris*; near Superior with *scutellaris* and *Lecointei*, and near Medora with *scutellaris* and *venusta*. In this

locality the species occur in the proportion usually of three *scutellaris* to two *formosa* and one *venusta*.

C. venusta, Lec., usually considered a variety of *formosa*, is claimed to be a valid species by Mr. H. C. Fall, of Pasadena, California. Mr. Fall bases his conclusion on habits and secondary sexual characters, and is undoubtedly correct in his claim.

I have taken it for a number of years in the sand hills near Medora, associated with *scutellaris* and *formosa*, as noted above. It is found, however, much nearer the pools at the bottom of sand "blow-outs" than either of these species. I also took a single specimen of *venusta* on the clay bluffs south of the Smoky Hill River at Wallace, Kansas, in July.

C. fulgida, Say, is reported from Western Kansas, in the valley of the Smoky Hill River, but I have only taken it along the edges of the salt marsh three miles west of Kackley, in Republic County. The present season I found it in numbers on July 7th. The height of its season is probably from June 20th to July 10th. It is taken with *togata* and *circumpicta*, and flies more quickly, but does not run so rapidly as these species. The red markings of some of the specimens had become almost black.

C. vulgaris, Say, occurs over Eastern and Central Kansas. I find it in abundance in Reno County, associated sometimes with *formosa* and *scutellaris*, and at other times with *repanda* and *hirticollis*; usually found on higher and more sandy localities than *repanda*.

C. repanda, Dej., is found in all parts of the State, along mud banks and along the bottoms of dry pools.

The variety *12-guttata*, Dej., is found over Eastern Kansas, but not so abundantly as *repanda* or *vulgaris*. I have taken it at Manhattan, near Osage City, on mud at bottom of coal strippings in June, and the present season I found a single specimen September 17th, under a stone on a shallow on the Verdigris River, near Benedict, Wilson County. A. W. Jones has also taken it near Salina.

C. hirticollis, Say, is reported at Lawrence and Topeka, by Prof. Popenoe as common on sand bars at Topeka. I have taken it August 16th, on sand bar in Arkansas River at Dodge City. The specimens were large and elytral markings wide. The present season I found it on May 27th, on wet bed of pools at bottom of sand "blow-outs," three miles south-west of Medora. It was found only in one locality, associated with *vulgaris* and *repanda*.

C. punctulata, Fab., is common all over the State, May, June, and July, and still later in the season. I find it each season at McPherson, at the electric lights; some of the specimens approaching the variety *micans* in colourings. The green and blue variety, *micans*, Fab., occurs in the valleys of the Smoky Hill and Arkansas Rivers, in West Kansas. I have collected it sparingly near Wallace and Coolidge. At Wallace it is found more frequently on the mud of dry pools and moist mud, associated with *punctulata*.

C. cuprascens, Lec., is found in Lawrence, Topeka, Hutchinson and Rooks Counties, on sand bars and on banks of streams, according to Prof. Popenoe. I have taken but a single specimen, on a salt marsh near Fredonia, Kansas, in June. Also taken occasionally at electric light at McPherson in June and July.

C. macra, Lec., I have taken at Great Spirit Springs, in Mitchell County, in July, and also on sand bar of Solomon River, near Kirwin, Kansas. It occurs at electric lights in Lawrence and Topeka, and I find a few each year in the electric lights in McPherson.

C. sperata, Lec. A variety of this species occurs on the wet mud near the water's edge of streams flowing through salt marshes. I took my first specimens in July, 1885, at the Great Spirit Springs. The past four seasons I have taken this variety in great abundance on the salt marsh near Kackley. During the hottest part of the day they fairly swarm over the hot, steaming mud, a single throw from the net often taking a half-dozen specimens. The variety taken in Kansas is different from that taken in Texas and New Mexico. The Kansas salt marshes probably mark its northern limit.

C. lepida, Dej., occurs sparingly throughout Kansas, from east to west, along the Arkansas River. Prof. Snow takes it at Lawrence at the arc lights, and it is taken in Topeka in the same way. It also occurs at Manhattan, and I found a single specimen August 16th on a sand bar near Dodge City.

C. cicumpicta, Laf., I first met with in Kansas on a salt marsh near Fredonia in June. This saline deposit is in South-east Kansas, and marks the south-east limits of this species in the United States. I have since taken it in numbers on saline deposits in Cloud, Mitchell, Republic, Stafford and Kiowa Counties, from June to August. It is more common around the edges of saline deposits, where there is some vegetation for shelter. During the hottest parts of the day, and also on

cool days, this species will congregate under cow chips and other places of shelter. The colours vary, more commonly bronze, frequently green, and less frequently blue; the elytral markings are also variable.

C. togata, Laf., occurs with the above species in all localities except on the salt marshes in Kansas, near Fredonia. It continues a little later in the season than *circumpicta* and is more difficult to capture, and it is also more commonly found on the bare open saline soil. Both the above species have long legs, are swift runners and quick fliers; the flight of *circumpicta* being more sustained than that of *togata*. The *togatas* taken near Kackley, in Republic County, have recently been described by Dr. W. Horn, of Berlin, Germany, under the varietal name of *Apicalis*.

The following is a translation of Dr. Walther Horn's description:

"*Cicindela togata*, Laf., var. *apicalis*, differs from the type by its greater size, more robust form, eyes less prominent, head and thorax very often much thicker; each apex of the elytra in the female much less rounded (the sutural spine a little retracted), in the male more acuminate; sculpture denser, the punctures sometimes here and there confluent; the markings brownish yellow and narrower. Length, $11\frac{1}{4}$ – $12\frac{1}{2}$ mm."

"This form (var. *apicalis*) of *C. togata* is specially remarkable from the striking shape of the apex of the wing-cases. The row of fossulae along the suture is much less prominent. The sculpturing of the wing-cases is distinctly more dense, the punctures are sometimes to a considerable degree confluent (they remain always more distant from each other at the very base and at the apex). The differences in the width of the prothorax are specially great in the ♂ specimen."

"Though the specimens before me show no variation at all considerable in the shape of the apex of the wing-cases, I have, nevertheless, decided to describe them only as a race of *C. togata*, as this character is very little constant in the whole genus *Cicindela*. Twenty years ago my illustrious colleague, Dr. George Horn, tried to separate as species the three forms, *cuprascens*, *macra*, *puritana*, using much slighter variations of the same character. I cannot, however, agree in this view. The differences stated are most variable, as well as the sculpturing of the wing-cases, the pattern, etc. The lateral emargination before the apex of the ♀ of *C. puritana* is sometimes less sharp than in *C. macra*, and the latter has often its apex (♀) quite as much truncated. Besides, *C. cuprascens* is far less constant. Especially in the ♂, transitions are frequent. I can therefore hold *C. puritana*, Horn,

and *macra*, Lec., as being only varieties (races) of *C. cuprascens*."—(Entomologische Nachrichten, Berlin, Jahrgang xxiii. (1897), No. 2, Seite 17-20.)

Kansas has two remarkable collecting localities for Cicindelidæ: the salt flat near Kackley, and the sand hills south-west of Medora, in Reno County. At the former locality, from July 1st to the 15th, can be found *Tetracha virginica*, *Cicindela fulgida*, *punctulata*, *sperata* var., *circumpicta* and *togata*. At the latter locality, from May 1st to June 1st, occur *Cicindela scutellaris*, *Lecontei*, *splendida*, *formosa*, *venusta*, *vulgaris*, *repanda*, *hirticollis* and *punctulata*.

To the thirty species and varieties herein enumerated as occurring in Kansas, other species will from time to time be added, as collectors more thoroughly explore Western Kansas.

CYANIRIS PSEUDARGIOLUS, BOISDUVAL AND LECONTE.

BY H. J. ELWES, F. R. S., COLESBORNE, CHELTENHAM, ENGLAND.

Mr. Butler's proposal to alter the well-known and universally accepted name of this species to *C. ladon* is one against which I must enter my strongest protest. Whatever species Cramer's figure may have been intended to represent, it certainly, in my copy, is not in the least like *pseudargiolus*, and even if it were like it, it is impossible now to say what *C. ladon* was. I will go further and say that even if it were possible now to prove that *C. ladon* was the same as *pseudargiolus*, the attempt to enforce the strict rule of priority in such a case as this would be contrary to good sense, and detrimental to the uniformity of nomenclature to which we hope some day to attain. Entomologists as well as botanists are now beginning to realize the impossibility of adapting the old rules of nomenclature to cases like this; and though I have little fear that any one is likely to follow Mr. Butler, yet it is just as well to let American Entomologists know that his dictum carries no authority in Europe. *Pseudargiolus* is certainly a much more appropriate name than *ladon*, because it indicates the near affinity of the American species to *C. argiolus*, Linn.

We deeply regret to learn that the Rev. Dr. Fyles, South Quebec, President of the Entomological Society of Ontario, met with a very painful accident a few weeks ago. He slipped upon a snow-covered board, and falling dislocated his ankle and fractured the socket. He has been confined to his bed ever since. His numerous friends unite in sympathy for him and in the earnest hope that he may speedily recover his health and strength.

LIFE-HISTORY OF MARGARODES FLEGIA, CR.

BY HARRISON G. DYAR, WASHINGTON, D. C.

This West Indian Pyralid occurred to me on the cemetery grounds in Key West, Florida. The larva was destructive to a large bush (*Thevetia nerifolia*), commonly planted there for ornament. The larva webs up a group of the narrow leaves into a tube, and eats the parenchyma from within, thus destroying much foliage and rendering the plants unsightly. The proper name of the species appears to be :

PAROTIS FLEGIA, Cram.

1775—*Phalena-Pyralis flegia*, Cramer, Pap. exot. ii., 66 ; pl. 140, f. D.

1832—*Phalena-Pyralis flegia*, Poey, Cent. Ins., Cuba.

1827—*Margaronia virginialis*, Hübn., Verz. bek. Schmett., 358.

1854—*Margarodes flegyalis*, Guén., Delt & Pyral., 310.

1854—*Margarodes phantasmalis*, Guén., Delt & Pyral., 310.

1854—*Paradosis villosalis*, Zeller, Lep. Cafr., 58.

1859—*Margaronia flegyalis*, Walker, Cat. Brit. Mus., xviii., 520.

1898—*Glyphodes flegia*, Hampson, Proc. Zool. Soc., London, 732.

Eggs.—Not observed, but probably laid in a mass, as the young larvæ are gregarious.

Stage I.—In a slight web on the back of a leaf, many together. Head about .3 mm., very pale brownish. Body translucent, green, the food showing green, the tubercles dusky, shining ; i. to v. present, no subprimaries ; on the thorax ia + ib, iia + iib, iv. single, anterior ; cervical shield with six setæ, prespiracular tubercle with two. There is a faint trace of an orange-coloured subdorsal line.

Stage II.—Head about .6 mm., pale brown. Body transparent green, with large black tubercles, the subprimary ones now present. Body slender, shining, the tracheal line visible and a trace of the broad orange subdorsal band, seen only with a lens near the extremities at first, later distinct but broken.

Stage III.—Head about .9 mm. Like the mature larva, pale blue, though looking of a dirty green from the food showing through the transparent skin.

Stage IV.—Head 1.4 mm. The same.

Stage V.—(Interpolated.) Head pale brownish, shining ; primary setæ present ; width 1.7 mm. Body subtranslucent pale blue, shining, a broad, deep orange stripe between tubercles ii. and iii., absent on joints 2

and 14, and broken into spots on joints 3 and 4. Tubercles very large, shining black; cervical shield divided into three warts on each side, the anterior bearing one seta, the posterior two, and the lower three; prespiracular tubercle with two setæ; subventral tubercle with one seta; on the other thoracic segments ia + ib, iia + iib, iii. separate, posterior, iv. + v., vi. with one seta; on the abdomen i. and ii. nearly in line antero-posteriorly, iv. + v. below the spiracle, iii. and vi. single haired, vii. a small wart with three hairs on the anterior side of the leg base. Thoracic feet black; abdominal ones slender, blue.

Stage VI.—Head pale brownish, orange tinted; width 2.15 mm. Otherwise no change.

Cocoon and pupa in a similar tube of leaves to that which the larva inhabits. Probably breeds continually. Imagoes emerged Feb. 6th.

OBITUARY.

On the 24th of February died Dr. O. Hofmann, a physician in the Bavarian State service, a well-known Lepidopterist and esteemed writer, in Regensburg, Bavaria. The deceased belonged to a family of entomologists. His brother, the late Dr. Ernest Hofmann, was the author of two illustrated volumes on the European Macrolepidoptera and their larvæ, which have already passed through three editions. Dr. O. Hofmann published a number of papers on the Tineides, and these results of his biological studies are held in great esteem. As a young man he came into contact with Herrich-Schaeffer, of whom he remained an admirer and could relate many anecdotes. Dr. Hofmann paid much attention to American publications. The observations of Dr. Dyar on the larval tubercles were familiar to him, and he had tried to test them on the European Pterophoridae, a group upon which he had published and with the transformations of which he was remarkably familiar. His death leaves a gap which is felt by earnest students in Europe. His last paper, on the Micropterygides, was read by him last autumn at the Munich meeting of the German Association, and is, I believe, not yet published. One of the kindest in the short list of my constant correspondents has passed away, whom I shall always miss, but whose future memory in the science may be always assured through his few but excellent contributions to our knowledge.

A. RADCLIFFE GROTE, Hildesheim, Germany.

NOTES ON A FEW BUTTERFLIES FROM THE YUKON.

Last April I received from Mr. Lachlan Gibb a small cardboard box containing a few specimens of Lepidoptera in a very fragmentary condition, which had been sent to him from Dawson, in the Yukon district.

The most interesting species in the collection is *Papilio Machaon*, var. *Aliaska*, Scud., of which there were three specimens.

The other species are :

Papilio Turnus, L., four specimens hardly differing from those found in this latitude, but perhaps a trifle smaller.

Pieris Napi, var. *Venosa*, Scud., three specimens.

Anthocharis Ausonides, Bdv., one specimen.

Argynnis Freija, Thunb., one specimen.

Argynnis Frigga, var. *Saga*, Kaden, one specimen.

The only moth in the collection was *Phragmatobia Rubricosa*, Harr., one specimen.

These are the only species which were determinable. The *Anthocharis* agreed with specimens received by me under the name of *Creusa*, but, to be sure, I sent it to Mr. Wm. Beutenmuller, who wrote to me that it was *Ausonides*.

HENRY H. LYMAN, Montreal.

HYDRÆCIA STRAMENTOSA, GUEN.

In response to Mr. Moffat's interesting paper, I would state, since my name is mentioned, that I recollect determining *H. stramentosa*, though rarely, and, I think, for Canadian collectors. The specimen in my collection, now in the British Museum, came, I believe, from Canada. I never remember receiving the species from the West, or regarding it as a specifically Western insect. All the specimens I ever saw of it (they were very few) were from the East. The name is, probably, in Canadian collections on my authority.

A. RADCLIFFE GROTE.

BOOK NOTICES.

THE ENTOMOLOGISTS' DIRECTORY.—This very useful publication has been prepared by Dr. Henry Skinner, Secretary of the American Entomological Society, Philadelphia. It contains an alphabetical list of over 1,200 names of persons interested in this department of natural science in the United States and Canada, and gives their addresses, departments of study, whether they have a collection or not, and are willing to exchange specimens; the names are also arranged geographically under the post-

office addresses in each State. This is followed by a list of Societies, Agricultural Colleges and Experiment Stations; an account of the Entomological organizations at Philadelphia, and a list of Entomological publications. Every one who wishes to exchange his duplicates for specimens from distant localities should obtain a copy of this Directory. It can be obtained from E. T. Cresson, Box 248, Philadelphia, Pa. (Price 50 cents.)

TYPES OF LEPIDOPTERA.—Dr. Herman Strecker has now published the third part of the supplement to his "Lepidoptera, Rhopaloceres and Heterocerces, indigenous and exotic." It contains a list of all the types of species that are contained in his extensive collection, with bibliographical and geographical references. No less than 425 species and varieties are included in the list, an immense number for a private collection, and descriptions are given of a number of new species. It is a matter of great importance to students to know where the types of described species may be seen; Dr. Strecker has therefore done a good work in publishing this list. In an interesting preface he gives some account of the principal sources from which he has built up his remarkable collection during the last fifty years and the difficulties under which he laboured in early days. These supplements may be obtained from the author, P. O. Box 311, Reading, Penna. (Price 25 cents each.)

MONTREAL BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The regular monthly meeting of the Montreal Branch of the Entomological Society of Ontario was held on Tuesday evening, at the residence of the President, Mr. A. F. Winn, 58 Bruce Avenue, Westmount. The chair was occupied by the President, and there was a good attendance of members. The Very Rev. Dean Carmichael and Mr. C. P. Newman were elected members. Mr. Henry H. Lyman, ex-President, in a brief speech, presented Mr. Winn, on behalf of the members, with a handsome mantel clock, with a suitably-engraved plate, as a wedding present, it being the first time in the history of the Branch that a President had been married during his occupancy of the chair.

Mr. Winn, who was taken by surprise, replied on behalf of himself and Mrs. Winn, thanking the members heartily for the present, which he valued very highly. Mr. Lyman then read a paper on Fall Web-worm Moths and allied species.

ERRATUM.—On page 100, sixth line from top, the word "six" has accidentally been omitted before "pairs under metatarsi I."

Mailed April 2nd, 1900.

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CONTENTS.

| | | | |
|--|-----|---|-----|
| Lyman—An Entomological Muddle..... | 121 | Dyar—The Larva of <i>Eustixia pupula</i> | 155 |
| Cockerell—New Coccidæ from Arizona..... | 129 | Dyar—Larvæ from Hawaii..... | 156 |
| Moffat— <i>Hydroecia stramentosa</i> | 133 | Toronto Branch—Annual Meeting..... | 158 |
| Melander—A Decade of Dolichopodidæ..... | 134 | Book Notice—Miss Ormerod's Twenty-third Report..... | 159 |
| Ashmead—Classification of the Fossorial, Predaceous and Parasitic Wasps..... | 145 | | |

AN ENTOMOLOGICAL MUDDLE: A REVIEW.

BY HENRY H. LYMAN, MONTREAL.

I fear that any one reading the various papers which have appeared during the past year on the *Cunea*—*Congrua*—*Antigone*—*Textor* controversy would not be very greatly impressed with the lucidity of entomologists. This controversy illustrates remarkably well the difficulty of carrying on a discussion about species or forms whose status is disputed without rendering confusion worse confounded, for the simple reason that different persons use the same name in different senses. For instance, when Dr. Fyles writes of *cunea*, Drury, he does not mean the insect which Drs. Smith and Dyar understand by the same name, the moth which Harris called the many-spotted ermine moth of the South, *Phalæna punctatissima*, A. & S., but the individual moth which served as Drury's type and which he chooses to believe did not belong to the genus *Hyphantria* at all, but to have been a *Spilosoma*, and from this springs much of the misunderstanding which has arisen between these gentlemen.

In such a case as this, one cannot be too careful to assume nothing and to avoid terms which may be misunderstood.

There are several questions in connection with these moths which require elucidation, one of which, and to my mind the most interesting, viz., whether *textor*, Harris, and *punctatissima*, A. & S., to use terms of which there can be no doubt, are, as generally believed, merely forms of one species, or, as believed by Harris, distinct species, has been very generally overlooked by these disputants.

In 1773, Drury described his *Bombyx cunea* in his "Illustrations of Exotic Entomology," while Abbot & Smith illustrated and described their *Phalæna punctatissima* in 1797. I have never seen the original edition of Drury, but possess the edition edited by Westwood in 1837, and have no reason to think that Drury's description was modified in any way in the editing.

The description is as follows :

"Alis albis, anticis maculis permultis, posticis duabus nigris, abdomine concolori nigro-maculato."

"*Upper Side*.—Antennæ pectinated and black. There is no appearance of any tongue. Head white. Back and abdomen ash colour. Anterior wings white, with a great number of spots, differently shaped, of a sooty black colour. On the external margin are five spots, those nearest the tips being shaped like triangles. Posterior wings white, with a sooty spot on each near the external edge, and a very faint small mark near the exterior angle. *Under Side*.—Legs black. Breast and abdomen ash colour. The wings marked as on the upper side."

"Alar expanse 1 inch 5 lines." "Habitat: New York." The figure shows a moth of about $35\frac{1}{2}$ mm. in alar expanse.

Abbott & Smith described their *Phalæna punctatissima* as follows :

"Ph. *Bombyx* elinguis, alis deflexis corporeque niveis nigro punctatis, thorace utrinque lunula nigra."

Phalæna cunea, Drury, is cited as a synonym, and then they say :

"Whether this be the *cunea* of Mr. Drury or not, it deserves a more expressive, or, rather, less erroneous, name. The character above given applies to the male only, the female being entirely white."

Westwood, in editing the re-issue of Drury's plates, says of *cunea*, which he calls a *Spilosoma* : "There seems little reason for doubting that this is identical with the *Phalæna punctatissima* of Abbot & Smith, of which the female is entirely white. The name proposed by Drury evidently alludes to the triangular spots on the margin of the anterior wings, and seems quite as expressive as that employed by Sir J. E. Smith, who seems to have treated Drury's work on several occasions as scarcely deserving of notice."

No subsequent writer, so far as I am aware, has questioned the identity of *cunea*, Drury, and *punctatissima*, A. & S., except the Rev. Dr. Fyles.

In 1828, Harris described *Arctia textor* in the 7th Vol. of the *New*

England Farmer, and in 1841 erected the genus *Hyphantria* for it, also placing in it *punctatissima*, A. & S.

In 1855, Walker described his *Spilosoma congrua* as quoted by Dr. Fyles on page 99 of Vol. XXXI., CAN. ENT.

In 1856, Fitch described *H. punctata* in his 3rd Report on the Insects of New York, p. 387.

In Grote & Robinson's list of Bombycidæ of 1868 they listed *Spilosoma virginica*, *congrua*, *vestalis*, and *Hyphantria textor*, *punctata*, *cunea*, with *punctatissima* as a synonym of *cunea*. Of *S. congrua*, these gentlemen wrote in Trans. Amer. Ent. Soc., II., 72 (1868), as follows :

"*Spilosoma congrua*, Walk., (c) = ♀ *Spil. virginica* (Fab.), Walk. Specimens a and b appear to belong to a species distinct from *S. virginica*, which should retain the name proposed by Mr. Walker. Our notes on these two specimens are as follows : '*S. congrua* (♂). Primaries white, with sparse brown dots and an S-shaped subterminal brown line, all incomplete. Abdomen entirely white. Faint discal marks on both wings, wanting in the female. Primaries (♀) with but one or two dots, almost immaculate. Secondaries immaculate in either sex. Inwardly the fore coxæ and femora are dark yellow, without the black spot of *S. virginica*. All the tarsi and fore tibiæ are inwardly brown. The ♂ has faint discal marks on both wings, wanting in ♀. This species seems slighter than *S. virginica*, and approaches *Hyphantria cunea* in the markings of the primaries, but is stouter than that species, the palpi and antennæ as in *Spilosoma*.'"

What these authors meant by an "S-shaped subterminal brown line" I do not know, as I never saw a specimen of *antigone* so decorated.

But in Grote's Check List of 1882 this species was not included, the *Spilosomas* named being *virginica*, *vestalis* and *latipennis*, and the *Hyphantrias*, the same as in the list of 1868, but in a different order, *cunea* and *textor*, however, being still recognized as distinct. But a few months after this list appeared, Mr. Grote proclaimed the discovery of *S. congrua*, Mr. Thaxter having reared it from the larva, and conjectured that it was "very likely" the same as the form which Mr. Strecker had named *antigone*. (CAN. ENT., XV., 9, Jan., 1883.)

In the April, 1889, number of *Entomologica Americana*, Mrs. Slosson described her *Spilosoma prima*.

In June, 1889, Mr. J. B. Smith published a note on *Spilosoma congrua*, Walk., in *Ent. Amer.*, V., 119, arguing that Walker's description

of congrua did not fit *S. antigone*, Strecker, but did fit *H. cunea*, Drury, presuming the latter to be the same as *punctatissima*, A. & S., and quoting a note of Mr. A. G. Butler's, written in 1875, to the effect that the only specimens then representing congrua in the British Museum collection were a presumably female specimen of *S. virginica*, without abdomen, and what he "believed to be" a male "variety" of *H. cunea*.

With all due respect to these authorities, I do not place any great weight upon conjectures that something is "very likely" the same as something else, or upon a "belief" that one moth is a variety of another, and it is hardly creditable to the custodians of collections in a great national museum which are not open to the public that types can be lost or destroyed.

In 1890, Mr. J. B. Smith again dealt with these forms in his "Preliminary Catalogue of the Arctiidae of Temperate North America," in the CANADIAN ENTOMOLOGIST, but, through an error of the printer, overlooked by the proofreader, all the names, whether recognized as good species or only as synonyms, were treated alike and stand apparently as species. (CAN. ENT., XXII., 161-165.)

In 1891, Dr. Smith issued his "List of the Lepidoptera of Boreal America," and in it listed the *Spilosomas* as *virginica*, *prima*, *vestalis*, *latipennis* and *antigone*, with *congrua* ‡, Grote, as a synonym; and under *Hyphantria* placed *cunea*, Drury; with *punctatissima*, S. & A.; *punctata*, Fitch; *congrua*, Walk.; *textor*, Harr.; *candida*, Walk., and *ab. pallida*, Pack., as synonyms, the last being an aberrant form which Dr. Packard had described in 1864 under the name of *Arctia pallida*, in his "Synopsis of the Bombycidae of the United States." (Proc. Ent. Soc. Phil., III., 118.)

This, then, was the condition of affairs when Dr. Fyles obtained the eggs of *antigone* in June, 1897, and a specimen of a much-spotted moth of the genus *Spilosoma* in the Gomin Swamp, and at the annual meeting in the following autumn read a paper under the title of "An Arctian—What is it?"

This paper was never published, but in the CANADIAN ENTOMOLOGIST for May, 1899, appeared a paper by the same author, entitled "Observations upon *Spilosoma congrua*, Walker," in which Dr. Fyles gave an account of his rearing of these larvæ and described the variation among the imagoes and identified them with Walker's species. Of the much-spotted moth taken at the same time as the parent of the larvæ, he said that it "presented the exact appearance of the insect which is figured,

with closed wings, in the original edition of Drury's work and named by him *Bombyx cunea*."

This, of course, was an error, as Drury's figure has the wings fully expanded both in the original edition and in that edited by Westwood, which was printed from the original plates.

Dr. Fyles's identification of the moths reared by him with the congrua of Walker may be correct, but it would be much more satisfactory if Walker's types were forthcoming; but his treatment of the webworm moths is not satisfactory.

Referring to the many-spotted ermine moth of the South, he says that its most spotted form is supposed to have been the *Bombyx cunea* of Drury, and that therefore it is said that the name of the variety must take the place of the name given by Harris, and till very lately generally accepted.

Now, the question as to whether the name *textor* should stand depends upon a number of questions: first, upon whether the immaculate form of the North is, or is not, specifically distinct from the spotted form of the South; and, second, upon whether the authorities are, or are not, correct in identifying it with the *budea* of Hübner; and Dr. Fyles apparently overlooked the fact that even if *cunea*, Drury, could be shown not to have been described from a southern webworm, the name *punctatissima*, A. & S., has priority of *textor*, if the two forms belong to the same species. Dr. Fyles, comparing the illustration of the webworm moth as figured by Dr. Riley with the figure given by Dr. Bethune in CAN. ENT., V., 141, instead of laying the blame for the absurd size of Riley's figure upon the incorrect drawing by the artist, apparently accused that eminent entomologist of confusing *antigone* and *punctatissima*, as he says: "Riley's cut represents an insect 20 lines in expanse of wings (it really shows one nearly 22 lines when measurement is made from centre of thorax to tip of each wing). I venture to say that no fall webworm moth ever attained such a size. But latitude was necessary to take in such moths as *congrua* and *cunea*." (The latter name apparently used in the Fyles sense, not that of authorities generally.) And a few lines further down, referring to the series of wings shown by Riley, says triumphantly in italics: "*There is not one of them but can be exactly matched from insects I raised, or that were taken with the mother insect in the Gomin.*"

If these sentences do not imply that Dr. Riley confused two or three species of moths, I cannot see that they imply anything.

Following Dr. Fyles's paper, appeared in the June CANADIAN ENTOMOLOGIST a paper by Dr. Dyar in which he admitted that Dr. Fyles was probably right in identifying antigone, Strecker, with congrua, Walker, but he stumbled in regard to Dr. Fyles's meaning about cunea, understanding it as equivalent to punctatissima.

In the July number, Dr. Smith dwelt on the probability of Mr. Walker having before him three banded specimens of punctatissima, and the improbability of his having three banded antigone from Georgia, and these arguments are of considerable weight, though naturally not conclusive, and, indeed, not intended to be so by the author.

To the September number, Mr. Grote contributed a page on this controversy, without adding any information of value, but showing that he has apparently forgotten that there were two species under the name congrua in 1867, the third specimen (c) being *S. virginica* ♀ according to G. & R.

In the December number there were no less than two papers upon this controversy. The first, by Dr. Ottolengui, affords some interesting information in regard to the distribution of *S. antigone* and also as to much-spotted specimens of punctatissima occurring in the spring brood in the South, but it would appear that he also stumbled in regard to supposing that Dr. Fyles meant punctatissima by the name cunea.

Dr. Ottolengui's theory in regard to the type of pattern in all species is ingenious and there may be some truth in it, but his illustration of it in the case of antigone is of no weight at all, as the dot or spot "at the second fork of the median nerve" as described by Dr. Fyles is not confined to *S. antigone*, but also occurs in *S. virginica*, *S. vestalis*, *H. punctatissima*, and *Leucarctia acrea*.

Again, in saying that this spot "is not a constant feature of Prof. Riley's series (Forest Insects, p. 246, fig. 87), if, indeed, it occurs at all exactly as it does in *congrua*," he is laying altogether too much stress on the supposed infallibility of the artist. No artist is infallible, and slight errors can be detected in almost every figure not taken by photography.

As to his aberrant specimens from Summerville, S. C., I sincerely hope he will not erect a new species in so variable a genus on such slender material, as I have a ♂ *S. virginica* taken *in coitu* with a normal ♀ which varies in a somewhat similar manner, the outer third of costa

and the outer portion of the nervures of the primaries about the apical portion being blackish, which makes it look as if slightly scorched at the tips as described by the Doctor. Dr. Ottolengui expresses his conviction that *congrua* is distinct from *cunea*, but this was surely unnecessary, and shows that he misunderstood Dr. Fyles's meaning, as no one has suggested that the ground-feeding *S. antigone* is identical with the tree-feeding *H. punctatissima*.

In the same number Dr. Fyles had a second paper upon the same tangled question.

Dr. Fyles derives the name *cunea* from the Greek *κυνέη* (a dog's skin), from a supposed fancied resemblance in coloration to the spotted carriage-dog of Europe, but I think Mr. Westwood's derivation from the Latin *cuneus* (a wedge) quite as probable, Drury having especially referred to the triangular marks. Dr. Fyles draws attention to the fact that the hind tibiae are not shown in Drury's figure, and that Walker did not describe the hind tibiae of what he supposed to be *cunea* or of what he described as *congrua*, but these points are of very minor importance, especially as in Drury's day entomological artists were not so particular about a spine or so, more or less, on the legs of insects.

Dr. Fyles says, in regard to *cunea*, that "we have nothing to guide us except Drury's figure, and Walker's description."

This is a very extraordinary statement, as we have Drury's description as well as figure; but how Walker's description of a few specimens of moths which he supposed to be identical with Drury's *cunea* could have any weight in deciding what Drury's moth really was, I fail to see.

Dr. Fyles, however, does not lay much stress on Walker's description of *supposed* *cunea*, but falls back on Drury's figure and finds it sufficient. I am not at all surprised at that, as I think that practically everybody else finds it sufficient also, as I believe that until Dr. Fyles became guilty of his present heresy, the belief that Drury's figure of *cunea* represented the much-spotted ermine moth of the South was one of those doctrines to which the formula "*semper, ubique et ab omnibus*" could be applied.

Dr. Fyles lays great stress on the fact that not one of the eight figures given by Riley to illustrate the supposed variation of *cunea* agrees exactly with Drury's figure, but this is really of no significance, as Riley was not trying to match that figure at all, but merely to show the range of variation, and in the case of so variable a species it might be possible to give a hundred figures and yet not have two exactly alike.

In Dr. Fyles's concluding remarks on *congrua*, he says :

(c) Dr. Hulst and others have bred it.

(d) *S. antigone* has been found to be identical with it.

These statements are too positive to be scientific. Dr. Hulst and others have bred *antigone*, and it seems probable that that species is the same as *congrua*, but that is all we can say at present.

In the January number of the present year Dr. Dyar very briefly points out Dr. Fyles's error, calling attention to the fact that of *cunea* the abdomen is described as "*concolori nigro-maculato*," the English description saying "back and abdomen ash colour." Drury's figure shows a white abdomen, while the abdomen of Dr. Fyles's specimen is yellow. Dr. Dyar pronounces this much-spotted *Spilosoma* to be *prima*, Slosson, and Mr. Beutenmuller thought last June that Mr. Winn's specimen of the same species which I showed him was possibly that species, but if so, either Mrs. Slosson's types must have been aberrant or she laid too much stress on the "cream-colour, almost buff" tone of the moth, as in these specimens the only yellowish tone is on the nervures.

I entirely disagree with Dr. Fyles, as I can see no resemblance, beyond the most superficial, between his specimen and Drury's figure, while I have a specimen of *H. punctatissima* from New Jersey which is practically identical with the figure of *cunea*.

I am, as mentioned by Dr. Dyar, at work upon the question of the relationship existing between *punctatissima* and *textor*, but am not in a position to make any report as yet.

NOTE.—Since writing the above, Dr. Fyles has published another paper upon this matter in the March number of the CANADIAN ENTOMOLOGIST, and in this has made plain what had better have been pointed out at first, that by *cunea* he merely referred to Drury's type and not to the species which has since been known by that name, but he falls into other errors.

He is wrong in implying that Dr. Ottolengui doubted the identity of *cunea*, Drury, and *punctatissima*, A. & S.

What Dr. Ottolengui expressed a doubt about was whether *textor*, Harris, and *punctatissima*, A. & S., were the same.

Abbot's figures of *punctatissima* ♂ and ♀ are admirable. What does Dr. Fyles mean by "an irregularly spotted insect?" The figure shows perfect bilateral symmetry. The figure of the larva is poor, but no worse than hundreds of other figures which have been made of larvæ.

Dr. Fyles calls Abbot's plate "quite a fancy sketch!"—presumably because the larva is represented as feeding on the mulberry, but I have no doubt it does, it is such a general feeder,—almost universal, Dr. Howard says.

Dr. Fyles's reference to Walker's description of what he took to be *cunea*, and what was doubtless punctatissima, is without weight, as I have mentioned above.

Drury only figured and described the ♂ of *cunea*.

Dr. Fyles seems to measure the expanse of moths from tip to tip as set according to the present fashion. This is misleading, and the measurement should be taken from the tip of wing to centre of thorax and doubled.

Dr. Fyles certainly sticks to his guns with a tenacity not surpassed by the Boers in the Transvaal, and asserts that even if his Gomin specimen is *prima*, Slosson, it only proves that the latter is a synonym of *cunea*, Drury!

Dr. Fyles sums up the matter by stating that he is convinced that *Hyphantria textor*, Harris, is not one and the same with *Bombyx cunea*, Drury, and in this I am inclined to agree with him, but surely such a statement was unnecessary after declaring *Bombyx cunea*, Drury, to be a *Spilosoma*.

FOUR NEW COCCIDÆ FROM ARIZONA.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STA.

Dactylopius Irishi, sp. n.

♀.—Adult dark red, forming a very convex chalk-white ovisac about 3 millim. long and $2\frac{1}{2}$ high, the sacs clustered on the twigs of the plant at the nodes, from two to ten at a node. Eggs and newly-hatched larvæ pale yellow.

Adult ♀, after being boiled and flattened on a slide, nearly circular, about 2 mm. long. The insects do not stain the liquor potassæ on boiling, but the body contains a dull crimson pigment, partly retained in boiled specimens.

Skin with many small round glands, which in lateral view look like truncate spines. Dermal hairs very few and small. No lateral patches of spines. Caudal lobes completely obsolete, marked only by a pair of short stout spines on each side. Hairs on anal ring comparatively short

and inconspicuous, much shorter than in *D. Townsendi*. Legs and antennæ pale yellowish.

Middle leg measuring about as follows in μ : Coxa, 111; femur with trochanter, 231; tibia, 180; tarsus, 90; claw, 30; width of femur, 57. Antennæ 8-jointed, the joints measuring in μ : (1.) 45-51, (2.) 36-40, (3.) 33-42, (4.) 18-27, (5.) 25-27, (6.) 16-24, (7.) 27, (8.) 69-78. Formula varying from 8132(47)56 to 8123(57)46.

Hab.—Tempe, Arizona: Numerous on the butte, on *Larrea tridentata*, Oct. 28, 1899. (*Ckll.*) This interesting species is named after Mr. Fred. M. Irish, of the Arizona Normal School, who was with me at the time of its discovery. *D. Irishi* is closely related to *D. Steeli*, which infests the same plant in New Mexico, but it is readily distinguished by its much more convex ovisac, and its habit of clustering on the twigs at the nodes, instead of living on the leaves. In the latter respect the insect resembles *D. prosopidis*. In the most advanced state the ♀ is very nearly, but not entirely, covered by the ovisac.

Aspidiotus (Hemiberlesia) candidulus, sp. n.

♀.—Differs thus from *A. lataniae*: Anal orifice smaller, about as big as one of the median lobes; width of anal orifice about 12 μ ; median lobes not or barely notched; nine squames, close together and little branched, on each side of the median lobes; inner chitinous processes of interlobular intervals conspicuously larger than the outer; spines (hairs) long, even exceeding the squames; four groups of circumgenital glands, posterior laterals 4 to 5, anterior laterals 4; margin of insect with very long bristles at distant intervals; embryos in ♀ very large, about 210 μ long; median lobes of embryo twice notched on outer side.

♀.—Scale white with a yellowish tinge, only slightly convex, exuviae sublateral, varying from pale straw-colour to ferruginous brown. ♂ scale elongate-oval, white, with the pale straw-coloured exposed exuvia near one end.

Hab.—Tucson, Arizona, just behind the University; locally abundant on leaves and twigs of *Prosopis velutina*, along with plenty of *Xerophilaspis prosopidis*. Collected in November, 1899, by the writer, in company with Prof. Toumey. The ♂ scales are much more abundant than the ♀; when originally describing *X. prosopidis* (Suppt. to Psyche, Dec., 1895) I had some of these ♂ scales, and regarded them as belonging to the *Xerophilaspis*.

Xerophilaspis Parkinsoniae, sp. n.

♀.—Scale small, about 1 millim. diam.; exuviae large, dark brown to black; first skin large, placed on second; second more or less covered by a white film; scale suboval, white, thin; the part of the scale beyond the exuviae is anteriorly much less than the diameter of the latter, posteriorly somewhat greater, the exuviae being excentric.

♂.—Scale oval, white; exuvia towards one end, brown, with a pale median line.

♀.—(Mounted on slide) About $700\ \mu$ long; spines moderately large; squames scarcely visible; caudal end striated; no circumgenital glands; anal orifice long and narrow, about $10\ \mu$ long and $39\ \mu$ from base of median lobes; median lobes rather large, about $12\ \mu$ long, close together but not contiguous, broad, rounded at ends, with a deep square notch on the outer side; second lobes smaller, separated from the first by a fair interval, pointed, notched on the outer side; third lobes rudimentary; dorsal glands few; interlobular chitinous processes present, but very small: they are beneath the lobes rather than between them; a submarginal row of elongate glands, such as are seen in *Chionaspis*; anterior part of insect brown even after prolonged boiling; antennae represented by large low-conical protuberances; embryo in ♀ very large, about $186\ \mu$ long, with dark eyes.

Hab.—Phoenix, Arizona, Oct. 23, 1899; on twigs and branches of *Parkinsonia torreyana*. The *Parkinsonia*, or "palo verde," is common around Phoenix, and I expected to find a coccid peculiar to it, but for many days my search was fruitless. At last I saw, one day, a tree with the branches on one side turned yellow, and on going up to it, found the above-described insect in great numbers. With the scales I found a small form of *Chilocorus cacti* predaceous upon them. *X. Parkinsoniae* is not a true *Xerophilaspis*, nor yet a satisfactory *Targionia*. It differs from typical *Xerophilaspis* in the development of the white scale, and the position of the anal orifice; but it agrees sufficiently in the form of the exuviae, the large embryo, etc.

Diaspis Arizonicus, sp. n.

♀.—Scale, dull white, more or less circular, but very irregular because crowded into the cracks in the bark; a thick ventral scale; exuviae very inconspicuous, yellowish-white, or first skin sometimes brown; first skin with its anterior end extending beyond margin of second.

♂.—Scale flat, firm (not at all woolly), dull white, parallel-sided, about $\frac{3}{4}$ mm. long and not quite half as wide.

♀.—Adult dark brown even after boiling in liquor potassæ, strongly chitinated, spiracles large and conspicuous; segmentation visible; caudal area brown and chitinated, except its basal portion, anterior to the anal orifice, which is transparent and colourless. The non-chitinated area at the base of the caudal plate permits the latter to be withdrawn almost wholly into the body, leaving the tip only protruding. No circumgenital glands. Caudal area very much wrinkled, with many round to oval dorsal glands, arranged more or less in transverse rows, and also rather numerous scattered small ventral glands. Anal orifice rather small, a long distance from hind end. Caudal margin strongly crenate; three larger protuberances, more or less emarginate at the ends, may be taken to represent the lobes; between the median lobes, instead of two squames, are two lobules; between the first and second lobes are two or three lobules; between the second and third are three to five lobules. No squames, but laterad of each lobe is a very long spine; two spines laterad of the median lobes.

♀.—Second stage not so chitinous, transparent after boiling; mouth-parts far posterior; antennæ represented by very large subconical protuberances.

Hab.—On trunks and branches of *Prosopis velutina*, Wooton, near Kellner's Ranch, several miles west of Phoenix, Arizona; Oct. 11, 1899. (*Ckll.*) *Xerophilaspis prosopidis* occurred on the same trees at the same place.

D. Arizonicus is remote enough from typical *Diaspis*, but by reason of the median interlobular structure, and the arrangement of the dorsal glands, it approaches nearer to the subg. *Epidiaspis* (type *D. piricola*). It is probable that it will later be made the type of a new subgenus.

A SALE OF BUTTERFLIES.

Entomologists went from all parts of the country when the celebrated collection of butterflies and moths made by the late Samuel Stevens, F.L.S., F.E.S., was sold. Mr. Stevens had continued his work of collecting, breeding, and buying for 60 years, and many specimens were already historic, having come from other noted collections. The "large copper" butterfly, long since become extinct, always attracts bidders, but £8 given for an exceptionally fine male creates a record, and even for one of the females £6 5s. was bid. A specimen of the common "painted lady" also fetched £8, while another of the same species cost its buyer £6 10s. A handsome "red admiral," which is perhaps nearly as often seen as the "small tortoiseshell," was sold for £5 10s., while a "peacock" with 20 "eyes" on its wings went for £5.—*London, England, Globe* (March 29, 1900).

HYDRÆCIA STRAMENTOSA.

SIR,—I am in receipt of a communication from A. Radcliffe Grote, M. A., Hildesheim, Germany, anent the determination of *Hydræcia stramentosa* for Canadian collectors. He points out to me that the fact of its being under *Apamea* in our list indicates the source from whence the name was obtained, as he was the only author that ever used that generic term for the group to which *stramentosa* belongs, proving that he knew of its being taken in Canada, having received specimens from collectors there to name; which is more than likely, as Mr. Grote was at that time the recognized authority on North American *Noctuidæ*.

The original Canadian collection was brought together from various sources to be exhibited at the "Centennial" in Philadelphia, 1876. Some material for it came from the Province of Quebec, which would be largely from Montreal collectors; and this collection was reviewed by Mr. Grote before it was dispatched on its mission. From exposure at Philadelphia and the Colonial and Indian Exhibition in London, England, 1886, what was left of it had mostly become worthless for comparison, and it was necessary to replace it as far as possible with fresh specimens. There is no evidence that there ever had been a specimen of *Stramentosa* in the original collection; if there was, it must have been returned to its owner. Other specimens, bleached beyond recognition, are yet in the collection—from want of fresh material to replace them; so I reason, that if there had been a specimen of *stramentosa* left in the collection, it would be there still. If such an one is extant, it will likely be found in some Montreal collection.

I have often thought when doubts were expressed about the correct determination of some specimen, that a label with the name of the determinator was of the very first importance to indicate in some measure its reliability. My Hamilton collection was largely determined for me by Mr. Grote, then living in Buffalo, and as I kept his lists for future reference, when doubt arose I could turn them up and feel that these particular specimens at least were correct beyond question. But time and *Anthrenus* worked havoc with some of the original specimens, which reduced the value of the lists, as the specimens replacing them were only my estimate of what were the same.

J. ALSTON MOFFAT,
Curator Ent. Soc. of Ont.

A DECADE OF DOLICHOPODIDÆ.*

BY AXEL LEONARD MELANDER, AUSTIN, TEXAS.

The ten species included in the present paper are all from the collection of Dr. Wm. M. Wheeler, under whose management this work was performed. As a slight token of my appreciation of his generosity and kindness, it pleases me greatly to dedicate one of the forms to him.

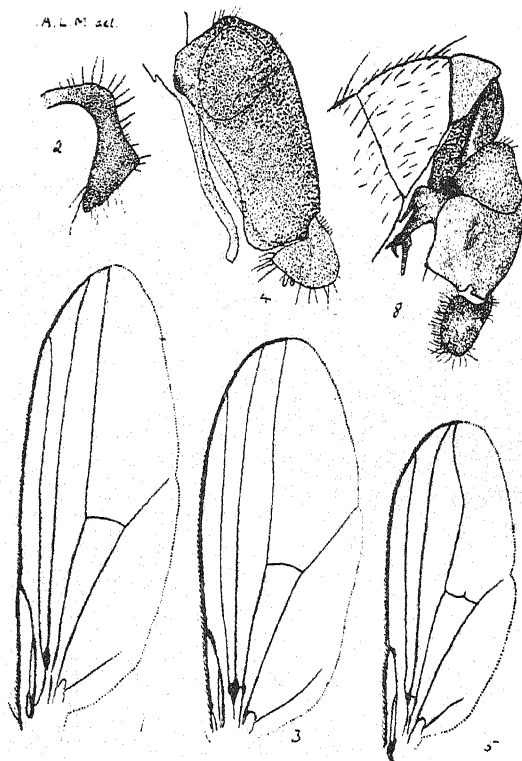


FIG. 9.

*Contributions from the Zoological Laboratory of the University of Texas, No. 2.

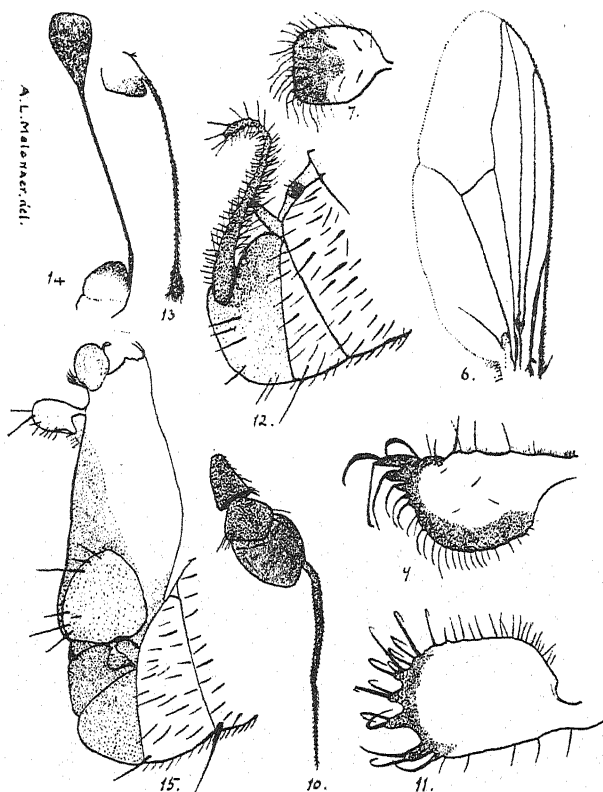


FIG. 10.

EXPLANATION OF FIGURES 9 AND 10.

1. *Hercostomus vetitus*, male wing.
2. *Hercostomus vetitus*, lamella of hypopygium.
3. *Hercostomus anarmostus*, male wing.
4. *Paraclius hybridus*, hypopygium.
5. *Paraclius hybridus*, male wing.
6. *Tachytrechus protervus*, female wing.
7. *Tachytrechus protervus*, lamella.
8. *Tachytrechus volitans*, hypopygium.
9. *Dolichopus sincerus*, lamella.
10. *Dolichopus sincerus*, male antenna, from inside.
11. *Dolichopus misellus*, lamella.
12. *Nematoproctus venustus*, hypopygium.
13. *Gymnopternus mirificus*, male antenna.
14. *Gymnopternus phyllophorus*, Lw., male antenna.
15. *Pelastoneurus Wheelerii*, hypopygium.

1. *Dolichopus sincerus*, n. sp. (Figs. 9, 10.)

Legs, except all the coxæ, hind tarsi and tip of hind tibiæ, yellow; cilia of inferior orbit black; fourth longitudinal not broken, but bent; antennæ black; legs plain; wings unspotted.

Male.—Length 4.5 mm., of wing 4 mm. Bright brassy-green. Face narrow, silvery-dusted, with a slight yellowish tinge on upper part, under the antennæ a little darkened. Palpi dark, silvery-dusted. Antennæ wholly black, third joint broadly ovate; arista a little longer than antenna, stout, tapering, not evidently pubescent. Vertex shining brassy-green, not dusted. Infra-ocular cilia pale yellow, not strong. Thoracic dorsum bright brassy-green, more cupreous along sides and with two cupreous stripes in front bounding the rather strong acrostichals. The velvety and the silvery spots present near base of wing. Abdomen shining, green, becoming more cupreous, then piceous towards incisures. Hypopygium with the lamellæ moderate in size, the lamellæ sub-triangular, whitish with wide black border and ordinary fringe of hairs. Pleura greenish, glaucous, and in various places with a cupreous reflection. Coxæ concolorous with the pleura, except at very tips; fore coxæ with black hairs and bristles on anterior surface; middle coxæ with white hairs intermixed with the black. Femora reddish yellow, slightly darker on upper surface, especially on hind femora toward tip; posterior four with a single preapical bristle; hind femora not ciliated beneath, although the small hairs are a trifle longer than usual; tibiæ yellow, except outer sixth of hind ones, where the black encloses a "dimple" on the outer side; tarsi plain, anterior four from tip of first joint and whole of hind tarsi black; pulvilli pale yellow, small. Wings grayish-hyaline, broad; costa elongate, thickened at tip of first vein; fourth vein with usual flexure; posterior cross-vein perpendicular to first segment of fifth vein and distant about three times its own length from tip of fifth; hind margin with rather evident fringing. Tegulæ and halteres yellow; tegular cilia black.

One male, collected by Dr. Wm. M. Wheeler, in Price County, Wisconsin, August 19, 1897.

Differs from *praustus* by the face being more silvery, vertex shining, fore femora not darker beneath, wings not blackened at tip, and the fourth longitudinal distinctly bent.

2. *Dolichopus misellus*, n. sp. (Fig. 11.)

Femora yellow, hind ones not ciliated; cilia of inferior orbit pale;

cilia of tegulæ black ; wings unspotted, fourth longitudinal not broken ; hind tibiæ tipped with brown ; antennæ black, red below on first joint ; fore coxæ reddish in front ; fore legs plain ; vertex violet-bronzed.

Male.—Length 5 mm., length of wing 4.5 mm. Face and palpi yellowish white. Antennæ lengthened, the joints subequal in length, black ; first joint reddish below, third with the arista preapical, a little longer than antennæ. Vertex violaceous with a cupreous tinge. Infra-ocular cilia pale yellow. Dorsum of thorax and scutellum bronzed-green, shining, not dusted. Abdomen strongly compressed, bronzed-green, shining, slightly dusted, incisures not well marked. Hypopygium not large, lamellæ rounded apically, yellowish-tinged, narrowly black-bordered, and fringed. Pleura dark green, dusted, yet shining in places ; the place of the usual velvety-black antealar spot is taken by a Y-shaped cupreous groove. Bases of middle and hind coxæ and posterior face of front coxæ piceous, glaucous ; the anterior face of the front coxæ is dark yellow, sharply limited, without the usual coating of black hairs, but with three of the strong apical ones and a few pale hairs. Femora yellow, the hind ones not ciliated and with a single anteapical bristle ; tibiæ yellow, except the hind ones at tip on inner side, an elongate apical "dimple" and a narrow glabrous streak on the posterior face of hind tibiæ, the dimple nearer the outside ; tarsi plain, blackened from tip of first joint (hind ones missing in male) ; pulvilli whitish. Wings grayish-hyaline ; veins not black ; fourth vein obtusely, but sharply, bent ; posterior cross-vein distant less than twice its length from tip of fifth ; costa with a small, lengthened, node-like swelling beyond junction with first vein. Tegulæ and halteres light yellow, the former with very long black cilia.

The female differs from the male by the broader, grayer face ; greener front ; shorter tegular cilia ; no costal node nor impression in hind tibia ; front face of fore coxæ with black hairs. Hind metatarsus with basal two-thirds yellowish.

One male and one female from Natrona Co., August 31, 1895, and one female from Little Wind River, September 2, 1895, Wyoming ; collected by Dr. Wm. M. Wheeler.

From the only species with which this could be confounded in any way (*setosus*, *platyprosopus*, *præustus*, *fulvipes* and *Coquilletti*) this species may be readily distinguished by the first short diagnosis.

3. *Gymnopternus mirificus*, n. sp. (Fig. 13.)

Very similar to *G. phyllophorus*, Loew, from which it differs by the

following characters only: Face less ochraceous, more gray; third joint of antennæ more oval, its arista slightly pubescent, terminating in a very small lamella; the hypopygium is scarcely a third the length of that of *phyllophorus*, though this is due in part to shrinking.

One male specimen; collected by Dr. Garry de N. Hough in Massachusetts.

Hercostomus has always been an incongruous genus, formed of species rejected from several genera. The next two species differ from all the genera of *Dolichopodidae* as now understood, but as they show evident affinity to the species of *Hercostomus*, they may be placed, at least provisionally, in that genus. The structure of the male hypopygium, the curvature in the third vein and the presence of oral bristles show a departure, more or less marked, from *Gymnopternus*. The following key is wholly artificial, but readily separates the species hitherto included in this much-abused genus:

- Legs largely yellow 2.
- Legs largely black 5.
- 2. Post-ocular cilia black 3.
- Post-ocular cilia pale 4.
- 3. Face ochraceous..... *procerus*, Wheeler.
- Face dark *vetitus*, n. sp.
- 4. Antennæ yellow..... *latipes*, Aldrich.
- Antennæ black..... *impudicus*, Wheeler.
- 5. Legs and lamellæ piceous..... *unicolor*, Loew.
- (Synonym *Gymnopternus panitens*, Wheeler.)
- Legs and lamellæ fuscous..... *anarmostus*, n. sp.
- 4. *Hercostomus vetitus*, n. sp. (Fig. 1, 2.)

Male.—Length 4.5 mm., of wing 4.5 mm. Face of moderate width, brownish. Palpi piceous, proboscis fuscous, surrounded with a fringe of bristles. Antennæ short, black, second and third joints together rounded obtusely pointed at tip, with a dorsal, short, gradually tapering, pubescent arista. Vertex dark greenish. Post-ocular cilia black; post-oral beard wanting. Dorsum of thorax dark blue-green, more shining posteriorly, scutellum blue-green, with surface hairy. Abdomen shining, dark blue-green, becoming slightly cupreous towards apex, incisures not darkened. Hypopygium large, sessile, piceous, slightly pubescent dorsally, the dorsal cardiform plate bristly; internal appendages reddish; lamellæ fuscous,

darker towards tip, slender, not lamelliform, fringed with black hairs outwardly and at apex, at basal third a sudden swelling, then of regular width to the triangular clavate apex. Venter concolorous with the rest of the abdomen. Pleura piceous, glaucous. Coxæ more or less darkened, except at tips; fore coxæ less blackened on anterior and posterior surfaces, with short, black hairs besides the long apical bristles; middle coxæ with usual apical brush of hairs. Legs yellow, slightly infuscated towards tip of tarsi; first joint of fore tarsi in length equal to the three following together, of the middle tarsi the first joint equals the next two and half of the third following joints, the hind metatarsus is shorter than the joint next following; posterior femora with a single apical bristle. Wings subhyaline, third vein slightly and gradually converging towards the fourth; anal angle rounded; posterior cross-vein perpendicular to proximal segment of the fourth vein. Tegular cilia black, tegulæ and halteres yellow.

One male, from Clementon, N. J.; collected by Mr. C. W. Johnson, May 30, 1897.

5. *Hercostomus anarmostus*, n. sp. (Fig. 3.)

Male.—Length 3.5 mm., length of wing 3.25 mm. Face rather broad, gray dusted. Palpi and proboscis piceous. Antennæ black, third joint lengthened, flat above, rounded below, rather acutely pointed, bearing the dorsal arista. Vertex dark greenish, opaque. Post-ocular bristles black. No beard present. Thorax shining, dark green, with usual bristles. Scutellum concolorous, sparsely bristly, and with a marginal row of a few short bristles in addition to usual two. Abdomen green, somewhat brassy, incisures not darkened. Hypopygium piceous, pubescent, its cardiform plate bristly; internal appendages lengthened, reddish; penis pointed; lamellæ infuscated, crescent-shaped, much thickened at middle and evenly attenuated to the tip, covered and fringed externally with short black hairs, apex narrowly but distinctly margined with black. Pleura and coxæ, except tips, green, overlaid with glaucous. Front coxæ with black hairs anteriorly; middle coxæ with fewer hairs than usual. Legs infuscated, especially on upper side of all the femora, tip of hind tibiæ, and fore tarsi from tip of first joint; middle tarsi from apex of first joint black. Metatarsus of fore legs a little shorter than three following joints, of middle equal to two following, of hind legs shorter than next joint and with a few short bristles below. Wings subhyaline, slightly tinged with yellow anterior to third vein and bordering each vein;

veins strong, black, a thickening in the first vein where it reaches the costa; third and fourth veins subparallel, the fourth vein ends slightly before the tip; posterior cross-vein bowed outwardly, perpendicular to the last segment of the fourth vein, a slight lobe under the posterior cross-vein; anal angle full, rounded. Halteres and tegulae yellow; tegular cilia black.

One specimen; Chicago, Illinois, June 10, 1899; collected by Dr. Wm. M. Wheeler.

6. *Pelastoneurus Wheelerii*, n. sp. (Fig. 15.)

Male.—Length 3.75 mm., of wing 3 mm. Face of moderate width, narrowest in middle, green, thickly overlaid with silvery dust, becoming yellow toward antennae. Proboscis piceous, palpi silvery, with a few hairs. Antennae wholly reddish-yellow, slightly subfuscated at apex; third joint short, ovate, bluntly pointed, arista short, tapering, with strong plumosity. Vertex largely green, dusted with yellowish-brown, on each side of ocelli a bluish space. Post-ocular cilia black above, white below; a few post-oral bristles present. Thoracic dorsum when viewed from the front dusted with yellowish-brown, wholly green except a purplish line on outer side of acrostichals, gradually wider behind, where it covers the dorsum except a pre-scutellar, triangular green spot. Above the base of the wing a \cup -shaped black velvety spot extends forward, terminating above in a silvery spot visible only from above. Scutellum green, with brownish dust, glabrous. Abdomen green, broadly silvered at sides, toward base of each segment cupreous; incisures blackened; first segment laterally with a strongly-marked marginal row of erect black bristles. Hypopygium subpedunculate, rather slender, dorsal half obliquely marked with green, glaucous, apical half (=remainder) shining, translucent yellow, internal appendages fuscous, enlarged, appearing like a second set of lamellae; at base of these is a close fringe of yellow bristles; penis not projecting; lamellae yellow, rather small, bent backward, circular at tip, fringed with light straggling hairs. Pleura concolorous with sides of abdomen. Fore coxae pale yellow, silvery in front, and with a moderate coating of black hairs; middle and hind coxae glaucous basally on outer face; middle coxae with several black bristles anteriorly and hind coxae with its usual bristle on outer side. Legs wholly yellow except toward tip of tarsi, where infuscation commences; metatarsus of fore legs shorter than three joints following, of middle legs shorter than two following, and of hind legs shorter than next joint; hind femora with a strong bristle on

lower outer surface below the usual preapical one. Wings with typical neurulation; the anterior region along the veins with a distinct darkening; posterior cross-vein inclines rather toward outer part of the fourth vein; anal angle full, almost rectangular. Cilia of the yellow tegulæ black. Halteres yellow.

One male taken along the Colorado River, south of Austin, Texas, October 7th, 1899, by Dr. Wm. M. Wheeler.

From allied forms the present species may be readily recognized as follows:

From *cognatus* by the green vertex, violet thorax, and shorter plumosity of the arista.

From *lineatus* it differs in the coloration of the thorax, the subpedunculate hypopygium and the lighter coloured lamellæ.

7. *Paraclius hybridus*, n. sp. (Figs. 4, 5.)

Male.—Length 3.75–4.25 mm., wing 3.5–4 mm. Face and palpi covered with a golden-gray dust, partially shining, face rather broad. Proboscis prominent, piceous, gray-dusted. Antennæ red; third joint slightly longer than broad, bluntly pointed, infuscated, especially towards tip; arista tapering, moderately plumose. Front cupreous, dusted with golden. Post-ocular cilia yellowish below. Dorsum of thorax and scutellum bronzed, opaque-dusted. Immediately above base of wing a black spot extends forward. Abdomen bronzed, somewhat shining, gray-dusted, especially towards sides. Hypopygium sessile; lamellæ small, triangular, piceous except at base on dorsal side, where pubescence is also lighter. The usual lamellar filament is wholly wanting. Pleura glaucous. Coxæ with black hairs; fore coxæ yellow, except extreme base; middle coxæ glaucous largely, and hind ones less so, on outer side. Legs reddish yellow; tarsi darkened from tip of first joint; hind femora ciliate with short black hairs below. Wings grayish-hyaline; bend of fourth vein less sharply angulate than in *propinquus*. Tegulæ and halteres yellow; halteres with black cilia.

Female.—Length 3.75–4.75 mm., wing 3.25–4.25 mm. Coloration as in male.

Seven males and five females taken at Woods Holl, Mass., July 14th to 27th, 1899, by Dr. Wm. M. Wheeler.

This species was taken in the same netful with another *Paraclius* and a *Pelastoneurus*. The proportions taken were:

| | Male. | Female. |
|---|-------|---------|
| <i>Pelastoneurus lamellatus</i> , Loew..... | 15 | 18 |
| <i>Paraclius hybridus</i> | 9 | 5 |
| <i>Paraclius propinquus</i> , Wheeler..... | 21 | 13 |

The intermediate character of the new species seems to indicate a case of hybridism, but the data are not sufficient to bear out this supposition. *Hybridus* shows affinity for *Pelastoneurus* in the trend of the fourth longitudinal vein and in the lack of the filamentous appendages of the hypopygial lamellæ. The other characters are, however, Paraclian. It may be readily recognized by the following combination of characters: Antennæ largely red; base of fore coxæ narrowly dark; front bronzed; lamellæ of hypopygium triangular.

8. *Nematoproctus venustus*, n. sp. (Fig. 12.)

Male.—Length 4.75 mm., wing 4.5 mm. Face narrow, of nearly equal width, reaching three-fourths of the distance from the antennæ to the lower corner of the eye, covered with silvery dust. Palpi small, yellow, inserted at sides of proboscis. Proboscis piceous, sparsely pubescent. Antennæ short, reddish; first joint longest, glabrous; third ovate, short, with dorsal, long, bare arista (pubescence scarcely perceptible under higher power). Front shining green, the white of the face encroaching along the sides above the antennæ. Post-ocular cilia yellow; lower occiput with long yellow hairs. Eyes hairy. Thoracic dorsum and scutellum brilliant green, slightly dusted anteriorly, and with faint indications of median cupreous stripings; above the base of the wing a velvety black spot present, stronger anteriorly. Abdomen hairy, incisures blackened; first segment brassy green, second and third translucent yellow, fourth cupreous becoming green, sixth green; hypopygium small, rounded, piceous, pubescent, terminal, with long, filiform, infuscated, hairy appendages; internal appendages inconspicuous; penis short, perpendicular. Pleura greenish, gray-dusted. Middle and posterior coxæ concolorous with pleura; anterior coxæ yellow. Legs yellow, except posterior tarsi and outer fourth of posterior tibiæ, which are infuscated; pulvilli not conspicuous. Wings clear, broadest about the middle; last segment of fifth vein once and one-half the length of the cross-vein; cross-vein oblique; last section of fourth vein converging towards third, then subparallel towards tip, distant from third vein, and terminating at tip of wing. Halteres and tegulæ yellow; tegular cilia long, pale yellow.

One male specimen taken by Mr. C. W. Johnson, at Westville, N. J., June 6.

Though the genus *Nematoproctus* has been abandoned by European dipterologists, it may be reinstated, at least provisionally, for this species whose habitus is different from any North American *Diaphorus* with which genus *Nematoproctus* has been united. The genus has never before been recognized outside of Europe.

9. *Tachytrechus volitans*, n. sp. (Fig. 8.)

Male.—Differs from *Floridensis* as follows: Front thickly covered with brownish dust, face with ochraceous dust. First joint of antennæ, when viewed from behind, brownish; when viewed from the front, opaque-black, except inner projection. Ground-colour of thorax of a brilliant metallic copper-colour, which shines through the thick coating of brown dust. Pleura and coxæ heavier white-dusted. Hind femora dark up to very tip. Pulvilli relatively longer, snow-white. Abdomen more cupreous. Pedicel of hypopygium more slender; hypopygium with penis projecting, distinct; lamellæ of similar form, but without the long black basal bristles, and evenly and closely fringed on outer side with longer hairs. The spot at tip of wing arises at tip of third vein and passes back so that the fourth vein bisects it. The third vein arches posteriorly at outer fourth. The fourth vein bends backwards at tip. The posterior cross-vein is less oblique and more sinuate.

The female differs from the male in the same characters as in *Floridensis*.

One male and one female, from twelve miles north-west of Lusk, Wyoming; July, 1895; from the collection of the University of Kansas

10. *Tachytrechus protervus*, n. sp. (Figs. 6, 7.)

Male.—Length 4.25 mm., of wing 4 mm. Face narrowed in middle, silvery dusted, yellower toward antennæ. Antennæ large, yellow; first joint short, second and third fully developed; third joint rounded, infuscated above and toward tip, bearing the dorsal arista once and two-thirds the length of the antenna. Vertex brownish-velvety. Post-ocular cilia black above, pale yellow, slender below. Thorax piceous green; above the base of the wing the horizontal black velvety macule and anterior silvery spot are present, above the former the dorsum is cupreous. Abdomen dark green, silvery-dusted along sides, incisures well marked. Hypopygium piceous, lamellæ subrectangular, dark, hairy, evenly fringed with short black hairs, which are lighter dorsally toward base. Pleura

black, silvery-dusted; metapleura prominent; coxæ concolorous except extreme tip, fore coxæ bronze-dusted in front. Legs black, except the following: Tips of femora below, basal two-thirds of middle and hind tibiæ, and front metatarsi, which are dark yellowish. The fore legs are ornamented as follows: Tibiæ thickened, dusted with yellow on anterior surface, and with longitudinal rows of short black bristles; tarsi compressed, first joint a little shorter than the rest together, pulvilli large. Wings hyaline; anal angle much fuller than in *angustipennis*; fourth vein turned forward toward third, ending considerably before the tip of the wing; posterior cross-vein distant its length from the apex of the fifth vein, bowed inward and surrounded by a very faint cloud. Tegular cilia black.

Female.—Length 5.5 mm., of wing 5 mm. Differs as follows from the male: Face ochraceous. Infra-ocular cilia a little stronger. Vertex, thorax, and abdomen a more brassy, brighter green. Red at tip of femora more spread, and at base of middle and posterior tibiæ more restricted; fore tibiæ yellow, with ordinary bristles; fore tarsi not compressed, first joint equal to next three. Wings with faint yellowish tinge, cross-vein more oblique.

One male from Clementon, N. J., May 10, 1896, and one female from Delaware Water Gap, N. J., July 8. Both specimens were received from Mr. C. W. Johnson.

The following combination of characters briefly distinguishes this species from all the known species of *Tachytrechus*:

Male artista without an enlargement; fourth vein curved forward, ending near third and distant from tip; cilia of inferior orbit pale; wings unspotted; antennæ largely red; fore femora plain, more or less yellow-tipped.

In 1878 Mik* established the genus *Macellocerus*, basing it upon *Tachytrechus machus*, Loew. From *Tachytrechus* this genus differed thus: "Zweites Fuehlerglied rudimentaer, das dritte klein, mit ausserordentlich verlaengerter, dorsaler Borste, welche am Ende schaufelfoermig erweitert ist. Der letzte Abschnitt der vierten Laengsader convergirt stark gegen die dritte, so dass die Muendungen dieser beiden Adern nahe einander stehen." The addition of *protervus* leaves *Macellocerus* based upon a single male character. Concerning the inadvisability of erecting a genus upon *machus*, Dr. Loew had already written.†

*Zur Kenntnis der Dolichopodiden, Dipterologische Untersuchungen, p. 5.

†Monographs of N. Am. Dolichopodidæ, p. 112.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA

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(Paper No. 1.)

In the CANADIAN ENTOMOLOGIST, during the year 1898, I gave a series of papers on the classification of the horntails and sawflies, representing the superfamilies SIRICOIDEA (Xylophaga) and TENTHREDINOIDEA (Phyllophaga); while the past year, 1899, I gave a classification of the entomophilous wasps, or the superfamily SPHECOIDEA (incorrectly spelt Sphegoidea).

The present year, 1900, with the permission of the Editor, it is my intention to give a similar series of papers on the classification of the superfamily VESPOIDEA, a large natural group, representing the genuine fossorial wasps, the papermaking wasps, potter wasps, and the predaceous, inquiline and parasitic wasps.

The wasps belonging to this superfamily are apparently closely allied to the wasps in the superfamily Sphecoidea, and have been quite recently classified with them; but they differ too widely, in various ways, to be included in the same family.

The superfamily Vespoidea I consider a compact, natural group, and it is readily separated from the Sphecoidea by the species falling in it *always having the posterior lateral angles of the pronotum extending back to and touching the tegulae, leaving no space, or sclerite, between.*

The *trochanters* in all the families in this superfamily, except in the single family *Trigonaliidae*, are, as in the entomophilous wasps, composed of a single joint; but in this family, however, there are *two* more or less well defined *joints*, a character overlooked when I published my table of superfamilies in the Journal of the N. Y. Entomological Society, Vol. VII., p. 46.

The table, therefore, should be corrected to read as follows:

cc. Trochanters 2-jointed.

Mandibles large, 4-dentate; hind wings *with* a distinct venation,
with two basal cells and a
radius Superfamily III., Vespoidea (pars).

Mandibles never very large nor 4-dentate, either simple, bi-dentate, or at most 3-dentate; hind wings *without* a distinct venation, at most, and *rarely*, with only one basal cell, the radius always absent. Superfamily V., Proctotrypoidea.

SUPERFAMILY III.—Vespoidea.

The families belonging to this superfamily may be distinguished by the characters made use of in the following table:

Table of Families.

Abdomen either sessile or petiolate, with the first ventral segment distinctly separated from the second by a more or less deep *constriction* or *transverse* furrow; legs most frequently fossorial. 5.

Abdomen either sessile or petiolate, but the second ventral segment *not* separated from the first by a strong constriction or transverse furrow; if somewhat constricted, then the legs are *not* fossorial and the wings are usually folded in repose; in the former case the legs may be either fossorial or simple.

Posterior legs usually short, the femora rarely reaching to or at least extending much beyond the middle of the abdomen; legs most frequently not fossorial. 2.

Posterior legs long, the femora most frequently reaching to or beyond the tip of the abdomen; tibiae in ♀ most frequently serrate or spinous, more rarely entirely smooth; middle tibiae with two apical spurs. Family XXVII., Pompilidae.

2. Wings not folded in repose; ♀ sometimes apterous. 3.

Wings folded in repose; never apterous.

Claws simple; middle tibiae with two apical spurs; sexes three, ♀ ♂ Family XXVIII., Vespidae.

Claws with one or more teeth beneath; middle tibiae with one or two apical spurs; sexes two, ♀ and ♂ Family XXIX., Eumenidae.

3. Metathoracic angles usually acutely produced, the metanotum posteriorly concave; scutellum large, flat, convex, conical or spined; if the metathoracic angles are rounded, which occurs rarely, the abdomen has only from 3 to 5 visible segments.

Abdomen normal, with at least 6 distinct segments, the venter flat; antennae usually strongly clavate, in ♀ knobbed at apex; scutellum very large, flat; species *not* metallic; antennae never more than 12-jointed. Family XXX., Masaridae.

- Abdomen abnormal, with from 3 to 5 visible segments, the terminal segments most frequently retractile, telescopic-like, the venter concave or flat; species metallic; antennæ most frequently filiform, inserted close to the anterior border of the head, 13-jointed, scutellum convex, conical or spined, rarely flat.....Family XXXI., Chrysididæ.
- Metathoracic angles rarely toothed or acutely produced, the metanotum posteriorly squarely truncate or rounded, not concave; scutellum normal or in some wingless females entirely absent; antennæ filiform or subclavate, rarely flabellate in some males; abdomen always with more than 5 dorsal segments.
- Hind wings *with* a distinct venation, and always *without* anal lobes; females never apterous.4.
- Hind wings *without* a distinct venation, and always *with* an anal lobe; females often apterous; middle tibiæ with two apical spurs; antennæ 10- to 26-jointed...Family XXXII., Bethyloidæ.
4. Trochanters 2-jointed; middle tibiæ with *two* apical spurs; eyes normal, *not* emarginate within; antennæ long, filiform, 15-jointed or more, similar in both sexes....Family XXXIII., Trigonalidæ.
- Trochanters 1-jointed; middle tibiæ with *one* apical spur; eyes reniform or emarginate within; antennæ in ♀ 12-jointed, in ♂ 13-jointedFamily XXXIV., Sapygidæ.
5. Middle coxæ contiguous or nearly7.
- Middle coxæ distant, usually widely separated.....6.
6. Stigma in the front wings *not* well developed, at the most only slightly developed, either very small or linear; eyes most frequently emarginate within; middle tibiæ with two apical spurs.
- Pygidium in ♂ deeply emarginate at apex, the hypopygium terminating in a sharp thorn or aculeus, which curves upwards and rests in the emargination of the pygidium; claws cleft.....Family XXXV., Myzinidæ.
- Pygidium in ♂ entire, or at most with only a slight sinus, the hypopygium terminating in three spines; claws simple.....Family XXXVI., Scoliidæ.
- Stigma in front wings well developed, ovate or subovate; eyes entire, never emarginate within; pygidium in ♂ entire, the hypopygium terminating in a sharp aculeus which curves upwards.....Family XXXVII., Tiphidæ.

7. Females always apterous, and frequently, but not always, without ocelli; eyes variable.....9.
Females always winged, with ocelli; eyes large, always extending to base of mandibles.....8.
8. Abdomen sessile or subsessile, and often with a more or less distinct constriction between dorsal segments 1 and 2; front wings with the stigma well developed, the marginal cell usually attaining the costa at apex (rarely rounded or truncate at apex, with a slight space between *Cosila* and allies); hind wings usually without an anal lobe, the cubitus either interstitial or originating beyond the transverse median nervure; very rarely originating before it; tibial spurs 1, 2, 2; tarsal joints normal; eyes entire; ocelli normal; hypopygium entire, not ending in a spine or an aculeus. Family XXXVIII., *Cosilidæ*.
Abdomen longly petiolate; front wings with the stigma small, not well developed, the second recurrent nervure subobsolete; hind wings bilobed, the cubitus originating far beyond the transverse median nervure; tibial spurs very long, straight; tarsal joints 2-3 in ♀ dilated, deeply excised or lobed and filled with a membrane between the lobes; eyes emarginate within; ocelli very large; antennæ very long, filiform, the joints with a bristle-like spine at apex..... Family XXXIX., *Rhopalosomidæ*.
9. Middle tibiæ with two apical spurs, rarely with one only, or none in some males.
Middle coxæ usually slightly separated by a triangular or bilobed projection of the mesosternum; females with the thorax divided into three parts, the pygidium usually subcompressed or otherwise formed, usually abnormal; hypopygium in ♂ most frequently armed..... Family XL., *Thynnidæ*.
Middle coxæ contiguous, not separated by a triangular or bilobed projection of the mesosternum, the latter being squarely truncate at apex.
Thorax in the ♀ divided into two parts; pygidium normal; hypopygium in ♂ produced into a sharp aculeus which curves upwards (very rarely simple, unarmed); hind wings *with* a distinct anal lobe, the cubitus originating from the apex of the submedian cell, interstitial with the transverse median nervure, or rarely originating beyond it..... Family XLI., *Myrmosidæ*.

Thorax in ♀ undivided, all the parts being closely united or soldered together, and *without* visible sutures between; pygidium normal; hypopygium in ♂ simple, unarmed, but the genital plate is armed with two slender straight spines which project more or less distinctly from the tip of the abdomen; hind wings *without* an anal lobe, the cubitus originating far *before* the transverse median nervure..... Family XLII., Mutillidæ.

FAMILY XXVII.—Pompilidæ.

This family, which is the first to be treated of in the superfamily, has long been known under the family name *Pompilidæ*.

The first genus to be described in the family, however, was *Ceropales*, Latreille, in 1796, which antedates *Pompilus*, Fabr., fully two years, the latter not being described until 1798, so that, following the now well-established rule in zoological nomenclature, viz., that a family name must be based upon the first genus described, the name *Pompilidæ* should probably give way to CEROPALIDÆ.

I am opposed to changing a well-established family name, and after much hesitation and long deliberation, I venture to retain this long-established family name.

The family Pompilidæ is quite distinct from all the others in the superfamily, by the uniform *habitus* of the species, the only group with which any of the species could be confused being probably some forms in the *Vespidæ* (subfamily Polistinae), some species of which bear a superficial resemblance in size, colour and shape to *Pompilus* and allies; but the non-folded wings, the venation of the wings, and the length and characteristic features of the legs, as well as cephalic, mandibular and palpal characters, readily separate them from the Vespidæ.

The history of the family and our present knowledge of the genera, may be best shown by giving the bibliography of the genera in chronological order, as follows:

1796.—*Ceropales*, Latreille, Prec. car. gener. Insect, p. 123. 1798.—*Pompilus*, Fabricius, Syst. Entom. Suppl., p. 246. 1804.—*Salix*, Fabricius, Syst. Piez., p. 124. 1806.—*Cryptocheilus*, Panzer, Krit. Revis. II., 120. 1808.—*Aporus*, Spinola, Insect. Ligur., II., p. 5. 1822.—*Planiceps*, Latreille, Nouv. dict. hist. natur., p. ? 1830.—*Macromeris*, Lepeletier, Magas. de Zool., I., pp. 29-30. 1836.—*Chirodamus*, Haliday,

Trans. Linn. Soc. Lond., XVII., p. 326. 1837.—*Agenia* (p. 321), *Prionocnemis* (*Prionocnemis*), p. 325, and *Episyron*, p. 34., Schiödte, Naturh. Tidsskr., I. 1840.—*Mygnimia*, Shuckard, Nat. Arrang. Insects, p. 179. 1844.—*Platyderes*, Guérin, Icon. regn. anim., VII., Insects, p. 435. 1845.—*Entypus* (p. 35), *Hemipepsis* (p. 123), *Homonotus* (p. 414), *Pogonius* (p. 453), *Ctenocerus* (p. 456), and *Cyphononyx*, Dahlb. (p. 461), Hym. Eur., I. 1845.—*Evagetes* (p. 390), *Micropteryx* (p. 396), *Calicurgus* (p. 397), *Anoplius* (p. 442), *Ferreola* (p. 467), and *Pallosoma* (p. 492), Lepeletier, Hist. nat. des Ins. Hym., III. 1851-2.—*Clavelia*, Lucas (= *Ctenocerus*, Dahlb., preoc.), Ann. Soc. ent. Fr. (2), IX.; Bull., p. 1, XXV.; et (2) X., p. 417. 1855.—*Maurillus* (p. 170), *Notocyphus* (p. 172), and *Parapompilus* (p. 176), Smith (= *Micropteryx*, Lapel., preoc.), Cat. Hym. Brit. Mus., III. 1867.—*Entypus*, Saussure, nec Dahlbom, Reise de Novara, Hym., II., p. 50. 1884.—*Paracyphononyx*, Magretti, Ann. Mus. civ. Genova, XXI., p. 44. 1884.—*Sphictostethus*, Kohl (p. 47); *Hoploneura*, Kohl (p. 47), = *Hoploneuron*, Kohl, and *Epipompilus*, Kohl (p. 57), Verh. Zoolog.-bot. Gesell. in Wien. 1887.—*Diplonyx*, *Cyphononyx* (*Cyphononyx*), and *Schistosalius*, Saussure, Soc. Ent., II., p. 3. 1887.—*Lophopompilus*, p. 42, and *Pompiloides*, Radoszkowski, p. 94, Horæ Soc. Ent. Ross, XXI. 1887.—*Telostegus* (p. 88), *Wesmalius* (p. 46), and *Pseudopompilus* (p. 80), Costa (A.), Prosp. Imen. Ital., II. 1888.—*Pseudoferreola*, Radoszkowski (p. 477), *Ceropaleoides* (p. 486), and *Prionocnemoides*, Radoszkowski, Bull. Soc. Natural d. Moscow. 1889.—*Meracus*, Tournier, Entom. Genev., I., p. 137. 1892.—*Hemisalius* (p. 313), *Hemipogonius* (p. 334), *Stenagenia* (p. 338), *Ctenagenia* (p. 342), and *Schistonyx*, Saussure, in Grandidier's Hist. de Madagascar, XX.

Classification of the Family.

Comparatively little effort has been made by those who have treated of these wasps to indicate the natural major groups of the family, or to indicate the natural relationship of the different genera.

Lepeletier, in *Histoire Naturelle des Insectes, Hymenopteres*, tome III., 1845, treats the family as representing two tribes in his Famille 14, Les Sphecides, viz., 4^e Tribu. Pompilites, with 9 genera: *Aporus*, *Evagetes*, *Planiceps*, *Salius*, *Micropteryx*, *Calicurgus*, *Pompilus*, *Anoplius* and *Macromeris*; and 5^e Tribu. Pepsites, with 4 genera: *Ceropales*, *Ferreola*, *Pepsis* and *Pallosoma*.

Frederick Smith, in his Catalogue of the Hymenoptera in the British Museum, Vol. III., 1855, ignores these tribes, but correctly treats the family as distinct from the Sphecidae. He has recognized 13 distinct genera, arranged in the following sequence: *Pompilus*, *Maurillus* n. g., *Salius*, *Notocyphus* n. g., *Ctenocerus* (= *Clavelia*, Lucas), *Planiceps*, *Aporus*, *Parapompilus* n. n.; for *Micropteryx*, Lepel.; *Ceropales*, *Macromeris*, *Mygnumia* and *Pepsis*.

Under the genus *Pompilus*, Smith incorrectly includes as synonyms *Priocnemis*, *Agenia*, *Episyron*, *Calicurgus* and *Anopilus*. *Maurillus*, Smith, placed by Dalla Torre in his recent catalogue as a synonym of *Pompilus*, does not belong to the family, but is evidently a good genus in the family *Cosilidae*, to which family also belong *Dicrogenium*, Stadelmann, described as a Bethyloid, and *Fedtschenkia*, Saussure, at present placed with the *Mutillidae*.

The next paper of any great importance on the group, is by Dr. Franz Frederick Kohl, entitled "Die Gattungen der Pompiliden," published in the Verhandlungen Zoolog-botanischen Gesellschaft in Wien, 1884, pp. 33-58.

In this important contribution Dr. Kohl gives a table of genera and has recognized as valid 15 genera and several subgenera and groups, arranged as follows.

I.—*Macromeris*, Lepeletier. Type *M. splendida*, Lepel. II.—*Agenia*, Schiödt. Types *A. variegata*, L., and *A. bifasciata*, Fabr. III.—*Pseudagenia*, Kohl, n. g. Type *Agenia carbonaria*, Scop. IV.—*Salius*, Fabricius. Types *S. bicolor* and *S. punctatus*, Fabr., = *Priocnemis*, Schiödt; *Hemipepsis*, Dahlb.; *Homonotus*, Dahlb.; *Entypus*, Dahlb.; *Pallosoma*, Lepel.; *Mygnumia*, Smith.

Four groups of subgenera are indicated: Gr. (1) *Cyphonyx*, (2) *Priocnemis*, (3) *Hemipepsis*, and (4) not named, with *Hemipepsis heros*, Guérin, as type. V.—*Calicurgus*, Lepeletier. Type *C. fasciellus*, Lepel. VI.—*Pepsis*, Fabricius. Types *P. ruficornis*, *dimidiata*, *amethystina*, *cœrulea*, *stellata*, *elevata*, and *grossa*, Fabr. VII.—*Sphictostethus*, Kohl, n. g. Type *Pompilus Gravesii*, Hal., = *Agenia speciosa*, Spin. VIII.—*Hoploneura*, Kohl, n. g. Type *H. apogona*, Kohl. This genus was subsequently changed to *Hoploneurion*. IX.—*Parapompilus*, Smith, = *Micropteryx*, Lepel. Type *P. (Micropteryx) brevipennis*, Lepel. X.—*Clavelia*, Lucas, = *Ctenocerus*, Dahlb. Type *C. pompiliformis*, Lucas. XI.—*Notocyphus*, Smith. Type *N. lævis*.

simus, Smith. XII.—*Ceropales*, Latreille. Type *C. maculata*, Fabr. XIII.—*Pompilus*, Fabricius. Types *P. viaticus*, ursus, Fabr., = *Aporus*, Spin.; *Episyron*, Schiödte; *Anoplius*, Lepel.; *Evagetes*, Lepel.; *Salius*, Dahlb.; *Homonotus*, Dahlb., and *Ferreola*, Smith.

Dr. Kohl, however, recognized 18 minor groups, briefly defined, but without specifying, in most cases, the species belonging in them. His groups he has arranged thus: Gr. (1), *Pompilus*, Thoms.; Gr. (2), *Aporus*; Gr. (3), no name; Gr. (4), no name; Gr. (5), *Aporus*; Gr. (6), no name; Gr. (7), no name; Gr. (8), *Aporus*; Gr. (9), no name; Gr. (10), *Aporus*; Gr. (11), *Aporus*; Gr. (12), *Episyron*, Schiödte; Gr. (13), *Pompilus 6-maculatus*, Spin., = *venustus*, Wesm., = *fraterculus*, Costa; Gr. (14), *Aporus*; Gr. (15), *Homonotus*, Dahlb., p. 35; *Salius sanguinolentus*, Dahlb., p. 34; Gr. (16), *Ferreola*, Smith; Gr. (17), *Ferreola*, Smith; Gr. (18), *Pedinaspis*, Kohl. Type *P. operculatus*, Klug.

XIV.—*Planiceps*, Latreille. Type *Pompilus planiceps*, Latr. XV.—*Epipompilus*, Kohl, n. g. Type *E. maximiliani*, Kohl.

This arrangement of Dr. Kohl's is in no sense a natural one. He has "lumped" many good genera (or natural groups) and interpolated, or at least brought into juxtaposition, genera or groups that are *widely separated*, and, again, widely separated others that are closely allied. I hope to bring this out clearly in my tables later on, when I shall call more special attention to some of these unnatural groupings.

Dr. Paolo Magretti, in this same year, 1884, in the Ann. Mus. Civ. Genova, Vol. XXI., p. 44, established the genus *Paracyphonyx*, an interesting new genus allied to *Cyphonyx*.

In 1887, Achilles Costa, in his Prosp. Imen. Ital., II., established three new genera, recorded above.

Genl. O. Radoszkowski, in the Bull. de la Soc. Imp. des Nat. de Moscow, (2) II., 1888, in his paper entitled "Revision des armures copulatrices des males de famille Pompilidæ," points out and figures excellent characters in the male genital organs of several genera. The difference in the male copulatory organ in *Ceropales* was so great that he remarks: "L'armure copulatrice du genre *Ceropales* n'a rien de commun avec la famille Pompilidæ, except la presence de palpes genital."

Genl. Radoszkowski subsequently makes *Ceropales* the type of a distinct family, the *Ceropalidæ*. The group is a natural one, and is here treated as a subfamily.

Tournier's genus *Meracus*, established in 1889, Entom. Genev., I., p. 137, I do not know, nor have I seen the description.

Saussure, in Grandidier's *Histoire de Madagascar*, Vol. XX., 1892, following the ideas of Lepeletier, recognized two tribes, *Pompiliens* and *Pepsiens*, but gives no substantial characters to support this separation, his tribe *Pepsiens* being composed of the genus *Pepsis*, and the *Pompiliens* of all the other genera.

The last author who has treated of the family is our well-known American hymenopterologist, Wm. J. Fox, of the Philadelphia Academy of Sciences, who, in the *Proc. Phila. Acad. Sci.* for 1894, divided the family into three tribes, (1) *Ceropalini*, (2) *Notocyphini*, and (3) *Pompilini*.

Two of these groups, the *Ceropalini* and the *Notocyphini*, are natural groups, the first correctly separated by Radoszkowski, but the third, or the *Pompilini*, is, as interpreted by Fox, a most unnatural group—a *potpourri* for the residue of the *Pompilid* genera.

The greatest difficulty in a study of the family has been the correlation of the very dissimilar sexes of some of the genera and the separation of the family into natural major groups. This difficulty has been the stumbling-block upon which most of the older authors fell, and upon which even to-day some of our most active workers are stumbling. Two or three cases may be cited for example: Fox, in *Tr. Am. Ent. Soc.*, XVIII., described two *Pompilids* from Jamaica, *Salix opacifrons* ♀ and *Agenia compressa* ♂; both, however, represent a single species, and neither sex belongs to the genus assigned to it by Fox. Another case in point is the *Agenia belfragei*, Cresson, a male insect, which was probably placed here by Cresson and Fox on account of the smooth, non-spinous legs, but which has no relation with a true *Agenia*.

Many other cases could be cited, but these, I think, will do to show the difficulty of the study of the *Pompilidæ*, and how deficient our generic definitions must be when our most able hymenopterologists are so easily led astray by superficial resemblances.

My studies in the family convince me that there are at least six major groups in the family, designated here as subfamilies, distinguished as follows:

Table of Subfamilies.

Labrum large, *free*, distinct; anterior tarsi in ♀ always *without* a comb, the hind tibiæ smooth, never *spinous*, or at most with only a few *feeble*, scarcely perceptible spines. 5.

Labrum neither large, *free*, nor distinct, usually entirely hidden under the clypeus, or at most with only a part—the tip—exposed; anterior tarsi in ♀ most frequently *with* a comb; hind tibiæ in ♀ frequently serrate and spinous, or only spinous, more rarely smooth, *without* spines, except in males.

Second ventral segment always *without* a transverse grooved line, impression or emargination; hind tibiæ in ♀ *never* serrate, although usually spined in both sexes; stigma rarely well developed. . . . 2.

Second ventral segment in ♀ *with* a distinct transverse grooved line, impression or emargination; stigma well developed.

Hind tibiæ in ♀ most frequently strongly serrate and also spinous, rarely *without* teeth or indistinctly serrate, in the latter case with a strong longitudinal ridge; in ♂ simple, neither serrate nor spinous, the hind tarsi very long, often more or less flattened or compressed, the basal joint long and often bent or more or less curved; second ventral segment *with* a transverse grooved line or emargination in both sexes. Subfamily I., Pepsinæ.

Hind tibiæ in *both* sexes smooth, *without* teeth or spines, at the most with *very* minute, scarcely perceptible or feeble spines, never with a distinct longitudinal ridge; second ventral segment *with* the transverse grooved line present in ♀ only, absent in ♂ Subfamily II., Ageniinae.

2. Hind tibiæ in *both* sexes smooth, *without* spines, or at most with very *minute*, scarcely perceptible or feeble spines. 3.

Hind tibiæ in *both* sexes always strongly or distinctly spined, the spines always well developed.

Antennæ inserted on the anterior margin of the head *on* or *below* an imaginary line drawn from the base of the eyes; head antero-posteriorly very thin, the face, clypeus and temples in ♀ very flat. 4.

Antennæ inserted *far above* such a line, or on or *near* the middle of the face, or at least considerably *above* the basal suture of the clypeus; head normal, or nearly; front wings with two or three cubital cells.

Clypeus anteriorly not produced, truncate or emarginate, not wholly covering the mandibles; pronotum rarely long. Subfamily III., Pompilinae.

Clypeus anteriorly semicircularly produced, covering the mandibles; pronotum always long, at least as long as the mesonotum.....Subfamily IV., Planicipinæ (pars).

3. Front wings with three cubital cells.

Head antero-posteriorly not especially thin, the face and clypeus at least subconvex, never flat; the antennæ inserted *on* or *near* the middle of the face, always considerably above an imaginary line drawn from bases of eyes. (Males only). Subfamily II., Ageniinae.

Head antero-posteriorly very thin, the face and clypeus very flat, the antennæ inserted towards the anterior margin of the head *on* or or just above an imaginary line drawn from bases of eyes (♀ and ♂).....Subfamily IV., Planicipinæ (pars).

4. Pronotum as long or longer than the mesonotum; front coxæ long, usually longer than the hind coxæ, the front femora in ♀ often much swollen or greatly incrassated.....Subfamily IV., Planicipinæ.

5. Pronotum very long; metanotum as long or longer than the mesonotum; eyes entire, *not* at all emarginate within; antennæ in ♀, after death, involute at tips; cubitus in hind wings interstitial or originating *before* the transverse median nervure; hind tibiæ not or rarely longer than their femora, usually shorter.....Subfamily V., Notocyphinae.

Pronotum not long, shorter than the mesonotum; metanotum short, much shorter than the mesonotum and obliquely truncate posteriorly; eyes *subemarginate within*; antennæ in ♀, after death, straight, *not* involute; cubitus in hind wings originating *beyond* the transverse median nervure; hind tibiæ much longer than their femora.....Subfamily VI., Ceropalinae.

THE LARVA OF EUSTIXIA PUPULA, HUBN.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The larva of this not uncommon little Pyralid feeds on the seeds of the peppergrass. It has not been described heretofore; the name as given by Packard (American Naturalist, IV., 229) is an error of identification, the species which he represents, copied from Abbot's manuscript drawing, being *Enemia crassinervella*, Zell., a Tineid. The true larva of *E. pupula* lives singly in the heads of the peppergrass in a loose open web, eating the unripe seeds out of the flat pods, forming two holes in each pod on the upper side. The larvæ, though fully exposed,

are difficult to see, as their colours harmonize well with the general appearance of the flower heads. The delicate open web is not conspicuous.

The number of larval stages has not been definitely determined, but I think there are seven. At first the little larva is entirely green, the head only pale testaceous. Later (by stage IV.) there are faint subdorsal and subventral pale shades with slight dusky bands between.

Stage V.—Green, subdorsal and subventral lines yellowish, faint, not distinctly broken in the incisures, the red shades between them faint; width of head 8 mm.

Stage VI.—Head slightly below joint 2, testaceous green, the clypeus high; width 1 mm. Body slender, green, the segments faintly transversely banded with yellow, also yellowish subventrally; dull crimson dorsal and lateral patches in the yellow bands, fainter at the extremities. Setæ long, slender, dusky, iv. + v. on the prominent subventral fold.

Stage VII.—Head green, mottled with brown over the lobes, ocelli black; width 1.2 mm. Body green, subventral fold narrowly whitish, dorsal segmental bands of dull crimson reaching the subventral fold, the edges irregular, projecting a little before at the spiracle. Setæ fine, dusky, rather long. The bands are on every segment from the prothoracic to the tenth abdominal.

Cocoon of silk, small and tough.

Food plant peppergrass (*Lepidium virginicum*).

LARVÆ FROM HAWAII—A CORRECTION.

BY HARRISON G. DYAR, WASHINGTON, D. C.

Meyrick's work on the Macrolepidoptera of the Hawaiian Islands* is a revelation of our previous ignorance of that fauna, since he describes no less than 200 new species out of a total of 292.

I have formerly described the larva of a Noctuid from Hawaii as *Laphygma flavimaculata*, Harv., but find, on consulting Mr. Meyrick's paper, that the name was wrongly applied. The five larvæ bred by me in Hawaii are as follows:—

Lycæna boetica, Linn.

Larvæ within the flowers of *Crotalaria longirostrata* at Honolulu.

*Fauna Hawaiiensis, Vol. I., part 2, Macrolepidoptera, by E. Meyrick, 1899.

Eggs, four larval stages and chrysalis observed ; widths of head .15, .3, .6, 1.0 mm. It is not necessary to describe at length this common European species.

Sphinx convolvuli, Linn.

Described as *Protoparce cingulata*, Ent. News, VI., 95, 1895.

Spodoptera mauritia, Boisd.

Described as *Laphygma flavimaculata*, CAN. ENT., XXVI., 65, 1894. The true *flavimaculata*, Harv. (= *Spodoptera exigua*, Hübn.), was taken, but not bred. The species were confused.

Plusia chalcites, Esp.

Larva a general feeder ; found at Honolulu. Abdominal feet on joints 9, 10 and 13. Head rounded, clypeus large, green, with a few black dots in some and a line on the side, some distance behind the ocelli. Body green, somewhat transparent, tubercles black. Double dorsal and subdorsal lines, crenulate, pale yellow, the subdorsal ones forming curves around the tubercles, not crossing them ; a single, straight faint substigmatal line ; spiracles black.

Pupa very pale green with a broad brown band on the back, which is irregularly streaked transversely with darker brown. In a thin cocoon of white silk.

Found on *Ipomœa*, *Crotalaria*, *Canna*, etc.

Omiodes Blackburni, Butl.

Meyrick says the larva feeds on banana ; but all mine were found on cocoanut palm (*Cocos nucifera*), to which they were very injurious. Found at Honolulu, sewing together the leaves behind, in the folds, with bands of thread at intervals. Several larvæ together ; they eat at the top and finally spin cocoons at the base of the leaf. Head rounded, median suture not deep, clypeus and mouth-parts small ; minutely shagreened, not conspicuously ; setæ rather long ; dull white, sordid, almost testaceous, with six moderately large black spots on each lobe, one over ocelli, one above this in line with another near the top of the clypeus ; one above this latter and another very near the median suture ; two more below the vertex, elongate and almost contiguous, directed towards the side of head ; jaws pale brown, black at base and tip ; width 3 mm. Body elongate, slender, transparent and nearly colourless, the green food showing by transparency. Joint 13 divided by a moderately distinct suture. Tubercles i. to iii. large, almost perfectly flat, transparent ; subventral

tubercles smaller and indistinct. A pale yellow, double, dorsal line, edging the dorsal vessel; tracheæ white, showing by transparency; spiracles small, faintly yellowish; feet pale. Pupa cylindrical, slender, slightly tapering, the antennæ and leg-cases projecting beyond the wing-cases; cremaster conical, not much flattened, terminating in several recurved spines. Colour pale brown, darker in the abdominal sutures. Length 17, width 4 mm.

TORONTO BRANCH OF THE ENTOMOLOGICAL SOCIETY OF ONTARIO.

The fifth annual meeting of the Toronto branch of the Entomological Society of Ontario was held on Friday evening, April 6th, in the Education Department. The chair was occupied by the Vice-President, Mr. E. M. Walker, and there was a good attendance of members. Four new names were proposed for membership. The President, Mr. Arthur Gibson, owing to his duties as assistant in the Division of Entomology at the Central Experimental Farm, Ottawa, was unable to be present, but sent his address. The report of the Council showed that the Branch had had a very successful year, fifteen meetings being held and a number of interesting papers contributed. Members of the Montreal Branch were thanked for the courteous exchange of papers with the Toronto Branch. The reports of the Librarian and Treasurer also showed the continued prosperity of the Branch. These reports, on motion, were received and adopted. The following officers were elected for the ensuing year:—D. G. Cox, President; E. M. Walker, Vice-President; G. M. Stewart, Secy.-Treasurer; H. C. Austen, Librarian; and R. J. Crew and C. H. Tyers, members of Council. The address of the retiring President was read by the Chairman, and reviewed the work of the Branch since its inception, particular mention being made of the year just ended. The members were urged to make extra efforts the coming summer to collect and mount specimens for the collection which the Branch is forming for the Education Department. The latter portion of the address took the form of a practical, illustrated paper on "The Preservation of Larvæ by Inflation."

BOOK NOTICE.

TWENTY-THIRD REPORT ON OBSERVATIONS OF INJURIOUS INSECTS AND COMMON FARM PESTS DURING 1899.—By Eleanor A. Ormerod, LL.D., F. R. Met. Soc., etc.

Miss Ormerod's last Report, which is the first of a new series, has just come to hand. As usual, it is full of interest to the entomologist, and contains many valuable practical suggestions for the farmer and fruit-grower.

There were, during 1899, complaints of the depredations of the ordinary farm and orchard pests, and also of a few which had been little noticed previously. The value of Dr. Ormerod's Reports to Canadian readers is shown by the large number of injurious insects treated of, which are now common to both Europe and America, or are represented on one continent by species closely allied to kinds with similar habits found on the other.

Cabbage butterflies of three species were very prevalent and destructive. Dusting the plants with a mixture of lime and soot was found to be of no avail, while syringing them with Little's "Antipest" was satisfactory. There is no mention of the simple and very effective remedy of dusting the plants with insect powder and flour, which has been found by far the best remedy in this country. An account is given of good work in lessening injury by collecting the butterflies. This was by the boys at Mr. W. Bailey's Aldersey Grammar School, in Cheshire. In the previous year the boys turned their attention to the caterpillars, and from 240 plants they gathered more than 5,000 caterpillars.

The Cheese and Bacon Fly.—This is the parent of the well-known "skippers" in cheese. These larvæ are also frequently found injuring hams. The remedies proposed are all of a preventive nature, such as the close screening of windows in ham and cheese curing rooms to keep the flies from entering, the frequent rubbing and turning of cheeses during the egg-laying season, and the destruction of the flies in the curing rooms by means of pyrethrum insect powder or the ordinary fly paper. All cracks in cheese should be filled at once with a mixture of flour, butter and pepper.

Portions of cheese or ham that are found to be attacked, should be cut out as soon as possible after observation; and, with regard to cheese, it is recommended that after cutting out the piece, a thorough dusting of

black pepper should be given and the cavity refilled with cheese and covered carefully with calico.

Leather Jackets.—The larvæ of the Crane Flies or Daddy Long-legs as enemies of grain crops and grass are treated of, and the use of nitrate of soda as a quick-acting fertilizer is recommended.

The Hessian Fly occurred at one locality, and a full resumé of the subject, compiled chiefly from United States reports, presents the important characteristics of the attack and the best remedies, in an attractive manner. Stress is laid on the importance of destroying the "flaxseeds" both in screenings and in stubble.

The Currant Gall Mite, an enemy of the black currant, which yearly causes much loss, is still under observation, and some interesting new experiments are reported as to discovering the method of distribution of the mites. It was found that plants cut down to the ground could be moved from an infested plantation, and there was no conveyance of infestation in the earth at the roots.

Flour and Grain Beetles.—Under this heading several familiar insect enemies of stored grain are treated of, viz.: The Rust-red Flour Beetle, the Cadelle and the Mediterranean Flour Moth.

The Grouse Fly (a parasite on grouse), the Hop Flea-beetle and the Land Planarian are the subjects of articles of much scientific interest.

Short Notices.—A new feature of this second series of Dr. Ormerod's Reports is a collection of short notes, in which recently-discovered facts on the appearance, habits, treatment or remedial measures are given of insects previously referred to at length in former Reports. Here we find, among other things, a mention of the occurrence in England of our troublesome Canadian enemy of the apple, the Eye-spotted Bud-moth; also a recommendation of a caustic alkaline spraying mixture of crude potash and caustic soda; and an attack upon strawberries by three species of ground beetles, the worst culprit being the Red-horned Ground Beetle (*Harpalus ruficornis*).

This valuable Report of 152 pages is replete with useful and practical knowledge, which must of necessity be of enormous value to all who read it. The illustrations are excellent and the volume contains a most complete index, which much facilitates reference.

J. F.

it is necessary to cite an example, and I take the first one at hand, remarking at the same time that these cases are very numerous, and that it is unjust to single out a particular person for condemnation.

In a paper published in Vol. 30 of the CANADIAN ENTOMOLOGIST, some 33 new genera of Phytophaga are proposed in consequence of the rearrangement of this group. In all cases, save one, the author is careful to state the species that served as types for the new genera, but in every case the old genus is represented by its initial merely, so that neither the direct statements of the author nor the context give the slightest clue to the name. Let us take a specific illustration. On pp. 286-287 is given a table of the genera of Hemichroinae, of which three are recognized: "*Hemichroa*, CURTIS; *Opisthoneura*, ASHM., n. g. (type *O. crevecoeuri*, ASHM.); *Marlattia*, ASHM., n. g. (type *H. laricis*, MARL.)." What, pray, is *O. crevecoeuri*? It can not be *Opisthoneura*, for that is a new genus, and the species *crevecoeuri* is not new. What does *H. laricis* mean? It is true that in this case the bibliographer can, by comparing species by species with DALLE TORRE'S catalogue, ascertain with great probability what these initials mean; but this involves many hours of study, and the Hymenoptera form the only group for which this would be at all practicable. Indeed, the recorder of the Zoological Record did not take such pains, so that in his report the initials have been allowed to stand quite out of connection with the original grouping, so that the confusion is still further increased.

But why should a scientific writer impose such burdens upon his readers? I refuse to believe that motives of economy force editors to print H. for Hemichroa, or that a man of science begrudges the few extra strokes of the pen necessary to make his published work intelligible. No, it is a mere matter of thoughtless habit, which needs only to be pointed out to be corrected.

HERBERT HAVILAND FIELD.

Zurich, Switzerland.

A NEW GENUS OF APHELININÆ FROM CHILE.

BY L. O. HOWARD, WASHINGTON, D. C.

Since the publication of the writer's "Revision of the Aphelininæ of North America" (Bulletin 1, Technical Series, U. S. Department of Agriculture, Division of Entomology, 1895), the discovery of new forms,

and especially of new genera, has been of very infrequent occurrence. Species have been received from all parts of the world, owing to the extraordinary and world-wide development of interest in scale insects, which are the principal hosts of the Aphelininae, yet nearly all of the forms thus received have been species already described, which have been carried with their hosts upon live plants to many different regions. It is, therefore, interesting to discover a new genus, even from a country like Chile, whose parasitic Hymenoptera are so little known. A most interesting feature of the discovery is that the new genus was reared from *Aspidiotus hederæ (nerii)* together with three of the cosmopolitan forms, namely, *Aspidiotiphagus citrinus* (Craw); *Coccophagus immaculatus*, How., and *Prospalta aurantii*, How. The writer is indebted to Mr. Edwyn C. Reed, of Rancagua, Chile, for this sending, as well as for many other favours.

APHYTIS—New Genus.

Female.—Resembles Aphelinus in the oblique hairless line extending from the stigmal vein transversely to base of wing. It differs principally from Aphelinus in the antennæ, which are only 5-jointed, the first ring-joint apparently being absent. The pedicel is nearly cylindrical; the first funicle joint cubical; the second funicle joint long = oval, wider than the first and more than twice as long; club long, elliptical, longer than pedicel and funicle together. The mesonotal sclerites resemble those of Aphelinus, but the ovipositor is exerted to about one-third the length of the abdomen, as with *Centrodora*; hind thighs somewhat swollen; stigmal vein is short and knobbed and the post-marginal vein is absent; the mandibles are tridentate; the ocelli large and placed in the form of an oblique angled triangle.

Aphytis Chilensis, n. sp.

Female.—Length to tip of ovipositor 0.94 mm.; expanse 1.8 mm.; greatest width of fore wing 0.18 mm. General colour pale yellow, with slight dusky tinge on the dorsum of the thorax; the lateral margins of the abdominal segments with dusky transverse stripes; antennæ fuscous; wings with a faint dusky cloud below stigmal vein.

Described from 1 female, reared by Edwyn C. Reed, from *Aspidiotus hederæ*, on ivy (presumably *Hedera helix*), Rancagua, Chile.

U. S. N. M., type No. 4968.

SOME NEW GENERA AND SPECIES OF PHYCITINÆ

BY GEO. D. HULST, BROOKLYN, N. Y.

Tetralopha formosella, n. sp.

Expands 18 mm. Head nearly pure white; thorax white with black scales intermixed; fore wings pure white, sometimes intermixed with black, and with black spot on costa to basal line; basal line black, with three long black teeth on outer side; middle field whitish, costa towards base black; along inner margin and reaching half way across wing, dull brick red, broken by median cross scale ridge, which is of intermingled black and white; outer line white, edged on both sides with blackish; outer field grayish, mixed with black, much darker along costa to apex; hind wings fuscous, much darker along outer edge; beneath fuscous on all wings, an outer lighter cross line showing on all wings.

Texas. National Museum type number is 4703.

Mineola scitulella, n. sp.

Of the size and much the appearance of *A. tricolorella*, Grt. It differs in the much more vivid colouring, being thus a much more showy insect, and especially in having the outer cross line edged outwardly with dull red.

Colorado.

Mineola rubescentella, n. sp.

Expands 24-26 mm. Fore wings a smooth reddish gray, the reddish a little more pronounced along costa and about the outer line; a faint reddish spot at middle of base along inner margin; a broad dark red basal cross line, reaching from subcostal vein to inner margin, narrowing towards the latter; discal spots faint, geminate, superimposed; hind wings shining fuscous, marginal line much darker; beneath an even light fuscous.

Tennessee. In appearance very considerably like *Acrobasis rubrifasciella*, Pack. National Museum type number is 4707.

Acrocaula, n. gen.

Palpi of ♂ erect, recurved, rather slender, somewhat long; maxillary palpi small; tongue strong; antennæ with tooth on inner side of basal member as in *Acrobasis*, then bent over basal member, with a slight scale ridge in the bend, the segments beyond this evenly ciliated with hairs on the under side; thorax untufted; abdomen tufted at end; fore wings 11

veins, 4 and 5 separate ; hind wings 8 veins, 2 far from angle, 3 separate from 4, 4 and 5 short stemmed, 7 and 8 stemmed. Type *comacornella*, Hulst.

Acrocaula comacornella, n. sp.

Expands 16 mm. Head and antennæ fuscous ; thorax smooth, shining fuscous ; abdomen fuscous, the segments edged posteriorly with whitish ; fore wings dark fuscous, with a broad lighter basal cross band, most distinct at costa, and with a narrow lighter costal patch from discal spot, which it just encloses, to outer line ; outer line very faint ; hind wings transparent fuscous.

Central Texas.

Nephopteryx modestella, n. sp.

Expands 26 mm. Head and palpi light gray, the latter fuscous at tip ; thorax light fuscous ; abdomen whitish, with segments fuscous in front ; fore wings light fuscous gray, with fuscous markings ; the basal and middle field more grayish or whitish, the latter broad at costa, running to a point on inner margin ; a broad fuscous basal band with a faint reddish tinge ; outer field fuscous gray, the outer line whitish dentate, preceded by blackish near costa ; hind wings fuscous, darker outwardly.

Mass.

Salebria Slossonella, n. sp.

Expands 16 mm. Palpi and thorax fuscous ; thorax smooth fuscous ; abdomen dark fuscous, the segments lighter posteriorly ; fore wings gray, consisting of white ground colour, with black scales heavily overlying ; a basal deep red scale ridge followed by a dull rusty yellow band, and this by a black edging ; costa half way of middle field from scale ridge narrowly reddish ; outer line light, not very distinct, close to margin ; hind wings transparent, outwardly fuscous.

Miami, Fla. ; Feb., Mar. From Mrs. Annie Trumbull Slosson, in whose honour the specific name is given. I have the ♀ only, and consequently the generic reference may not be correct.

Salebria afflictella, n. sp.

Expands 14-18 mm. Palpi, front and thorax blackish fuscous ; abdomen fuscous, the end orange ochreous ; fore wings blackish, a purple spot, quite large, along inner border on basal space ; basal cross line broad, whitish, oblique, straight ; middle field in centre, whitish ; outer line fine, whitish, rather strongly bent, dentate ; discal spots geminate, superimposed, black, prominent ; hind wings dark fuscous.

Elizabeth, N. J.; from Mr. Kemp. I have another specimen, a male, from Mr. Kearfott, from Montclair, N. J., which seems to be the same species, but the extremity of the abdomen is fuscous in colour. Both specimens were taken in August, the one from Mr. Kearfott at light.

Salebria nigricans, n. sp.

Expands 20 mm. Palpi and front blackish; thorax in front fuscous, with a purple tinge, blackish gray behind; abdomen light whitish fuscous, with intermingled black scales; fore wings with a white base, heavily overlaid with black scales, giving a clear dark gray appearance; an ochreous tinted spot at middle of basal field; basal line whitish, well out to discal spots; middle field more whitish, owing to fewer black scales; outer line whitish, bent, edged rather broadly with black near costa; hind wings fuscous.

Phoenix, Ariz.; June 1st; from Dr. Kunze. I have the female only, and the generic reference is provisional.

Salebria lacteella, n. sp.

Expands 18 mm. Palpi light ochre fuscous; front white, slightly fuscous stained; thorax light ochre fuscous; abdomen light fuscous, nearly white on two anterior segments; fore wings light gray, stained with reddish ochre along inner margin, in basal field just outside of basal line, and just within outer line, the stain reaching nearly one-half across the wing; basal line blackish, well out, oblique; outer line whitish, bent, with considerable blackish broadly on both sides over middle space; hind wings dull whitish, with a narrow fuscous marginal edging.

Central Texas; female only.

Passadena, n. gen.

Labial palpi horizontal, moderately long, second member heavy, third member small, deflected; antennæ of ♂ bent above base, with a furrow in the bend; fore wings 11 veins, 4 and 5 short stemmed; hind wings 8 veins, cell rather short, 2 at angle, 3, 4 and 5 stemmed, 4 and 5 almost to end. Type *constantella*, Hulst.

Passadena constantella, n. sp.

Expands 16-18 mm. Palpi whitish gray, black on end; front and thorax clear gray; abdomen fuscous to fuscous ochre; fore wings clear white, with black scales more or less thickly intermixed, giving a clear bright gray appearance; basal lines black, geminate, inclosing ground

colour, bent and almost dentate at middle; outer line very oblique, black, heaviest towards costa and beginning well towards apex; with a deep sinus inwardly, then a strongly projecting tooth outwardly at vein 5, then a long reach inwardly, and two teeth before reaching inner margin; hind wings clear white, a fuscous marginal stain, the fringes somewhat fuscous.

Southern California. The insect has considerably the appearance of *Salebria bifasciella*, Hulst, and in some respects is structurally very like *Getulia flavidorsella*, Rag. The genus *Getulia* was founded upon the female only, and *G. institella*, Rag., a West African species, is the type; whether *flavidorsella* or *constantella* are congeneric can not be told till the male is found, but it is almost a certainty that *constantella* at least is not. National Museum type No. is 4704.

Megasis cinctella, n. sp.

Expands 15 mm. Palpi and head fuscous; thorax fuscous, with ochre tint; abdomen ochre fuscous, more fuscous above and lower part of sides; fore wings gray, the veins somewhat broadly and loosely whitish gray; basal line indicated by a dark spot at costa and another at middle of wing; outer line blackish, fine, angled outward at vein 5, then dentate, angled back again at vein 3, edged outwardly with whitish; hind wings transparent, with fuscous margin.

Argus Mts., Cal.; taken by Mr. Koebele, May 31; with the venation of *Megasis*, but while the palpi seem to be as in that genus, there has been distortion of them, and I have the female only; the generic reference is therefore provisional. The National Museum type number is 4705.

Sarata cinereella, n. sp.

Expands: ♂ 32-34 mm., ♀ 26 mm. ♂, palpi long, slender, black towards tip, gray basally; front dull white to gray; thorax light fuscous to blackish gray; abdomen fuscous; fore wings of an even clear light gray, made by a sprinkling of black scales upon a white field; inner line very faintly suggested by a darkening of colour; outer line suggested very faintly by a shade of whitish; hind wings light fuscous, with dark fuscous marginal shading.

♀, palpi blackish; front white; thorax gray, with white and black scales; abdomen fuscous; fore wings dark clear even gray, with two

distinct white cross lines, the basal straight, oblique, heavily edged with black outwardly, the black broadest at costa, the second line scarcely bent, broadly edged inwardly with black; hind wings dark fuscous.

Colorado. Easily distinguished from its congeners by the even colour of the fore wings of the ♂. The ♀ is rather difficult to separate from the other species.

Melitara junctolineella, n. sp.

Of the size and general appearance of *M. dentata*, Grt., and of the same colour; the outer dentation of the basal line is very much extended, as is the inner dentation of the outer line, so that they meet and join at the centre of the middle field.

Colorado, Texas.

Zophodia epischnioides, n. sp.

Expands about 26 mm. Labial palpi porrect, end member long, somewhat deflexed, middle member heavy, curved, long, sordid gray in colour, white at tip; front strongly cone tufted; antennæ ciliate, subdentate; maxillary palpi small; fore wings rather long, subparallel, rounded at apex, the anterior half gray cervinous, more whitish along costa, the posterior half dull ochre reddish fuscous basally, gradually fading at middle into the colour of the anterior part of the wing; hind wings dark fuscous, broad; beneath, dull fuscous on all wings.

Decidedly like *Epischnia* in appearance, but near *Zophodia*, though not strictly congeneric. The antennæ of the ♂ are flattened and subdentate; veins 4 and 5 of the fore wings are separate, not stemmed as in *Zophodia*, and the tongue is short and stout.

Zophodia fuscatella, n. sp.

Expands about 25 mm. Palpi, front and thorax even dark fuscous gray; antennæ of the male simple, fringed with tufts of hairs, two on each segment; fore wings even fuscous mouse gray, the lines scarcely, if at all, evident; hind wings fuscous, slightly darker on the margin.

Los Angeles, Cal. The National Museum type No. is 4706. The insect differs from the typical *Zophodia* in the structure of the antennæ and in the position of vein 2 of the hind wings.

Euzophera inornatella, n. sp.

Expands 24 mm. Palpi and front fuscous; thorax whitish in front, fuscous behind; fore wings gray, composed of scattered black scales on

a white ground, the white colour being clearer on subcostal vein; two superimposed black spots are just within half the distance out of the wings, one on median, the other on vein 1; outer line suggested by three or four small diffuse blackish spots; marginal line of black dots; hind wings fuscous, marginal line dark fuscous.

Anglesea, N. J.; from Dr. John B. Smith.

Psorosa Texanella, n. sp.

Expands 18 mm. Palpi ochreous; front, thorax and abdomen violet ochre; fore wings ochre, overlaid with blackish fuscous, more prominent along costa, less so in posterior portion; basal space rust red; basal line a broad indeterminate blackish fuscous band; this is followed by a large reddish spot along inner margin, outer line near margin blackish, indeterminate.

Central Texas.

Canarsia gracilella, n. sp

About the expanse of *C. ulmiarrosorella*, Clem.; the wings are narrower than in that species; the ground colour is less clear and darker, and is uniform over the wings; the basal line is obsolete, the outer line faintly evident; discal spots alone are strong, black, coalescent.

Montclair, N. J.; from Mr. Kearfott; taken at light in July and August. This insect appears quite different from *C. ulmiarrosorella* as above, and is a more slender insect.

Selagia australella, n. sp.

Expands 18 mm. Palpi long, slender, fuscous white at end of second and base of third segments; thorax bluish gray; abdomen fuscous gray, darker above; fore wings light gray, composed of white mixed with some black scales, lighter at base and beyond basal lines along inner margin; basal field limited by a fine black line, obsolete at costa, broken dentate, this edged within at middle of wings with white, and followed at middle by a rusty red spot; beyond this two lines, blackish, enclosing white at middle, subparallel, distinctly and quite strongly dentate, reaching across wing; discal spots two, black, superimposed; outer line black, fine, bent and dentate, edged outwardly with white; an interrupted black marginal line; hind wings whitish, margin fine, blackish.

Central Texas. I have the ♀ only.

Honora fumosella, n. sp.

Expands 15 mm. Palpi, front, thorax and abdomen very dark

fuscous, almost a dull black; fore wings almost or quite as dark, with two fine whitish cross lines, the basal straight or nearly so, slanting obliquely outward to inner margin; outer line straight, also slanting outward towards inner margin; a faint whitish cross line on basal area, and a large dull reddish spot between this and the basal line, just posterior to cell; middle space behind cell faintly reddish, hind wings dark fuscous, darker outwardly.

Newark, N. J.; from Mr. Kemp; taken at light, July 23.

Eurythmia Coloradella, n. sp.

Expands 14 mm. Palpi and front blackish fuscous; thorax dark fuscous; abdomen fuscous, lighter coloured towards end, the extreme tip being ochre coloured; front wings dark fuscous, more tinted on posterior part behind cell, and somewhat more strongly on outer field; cross lines very faint and indeterminate; veins on outer field more darkened; hind wings smoky fuscous, darker at margin.

Colorado.

Peoria albidella, n. sp.

Expands about 26 mm. Palpi white, a little fuscous stained; front white; thorax dull fuscous white; abdomen white; fore wings pure white, slightly tinged with fuscous, and with a few scattered dark scales; hind wings the same colour or a little lighter.

Death Valley, Cal.; taken by Mr. Koebele, in April. The type number of the National Museum is 4709.

Urula, n. gen.

Palpi long, crambid-like, porrect or drooping; maxillary palpi small; tongue nearly obsolete; antennæ of ♂ not bent above base, dentate, with tufts of hairs on each segment; antennæ of ♀ simple; front with a strong conical tubercle, horizontally edged at apex; fore wings 11 veins, 4 and 5 separate, 10 from cell; hind wings 7 veins, 2 distant from angle of cell, 3 and 4 from a point, 8 short stemmed with 7. Type *incongruella*, Hulst.

Urula incongruella, n. sp.

Expands 18-21 mm. Palpi ochre to whitish; thorax whitish to ochre fuscous; abdomen fuscous to gray, ochre tinted on two anterior segments; fore wings ochre to light gray, strongly mixed with dark scales from subcostal to vein 1, and reaching from base to outer line; inner line whitish, rather broad, rounded; outer line whitish or ochreous, oblique, sinuous, the wings being darkest just before it; outer field grayish to

russet ochre ; a black spot along costa, just beyond outer line ; margin blackish ; discal spots faint, joined by a circular russet ochre spot ; hind wings light fuscous, marginal line dark fuscous ; all fringes ochre to gray, interlined with dark fuscous.

Argus Mountains, Cal.; taken by Mr. Koebele, in April.

Phoenix, Ariz.; taken early in June. National Museum type number is 4708. The insect has very strongly the appearance of *Lipographis leoninella*, Pack.

Aurora nigrocinerella, n. sp.

Expands 17-19 mm. Palpi, front and thorax clear blackish gray ; abdomen fuscous ; fore wings broad, clear light gray, overlaid more or less with black scales, but the whitish showing as edges of basal line, also within outer line, becoming very broad at costa, also as outer edge of outer line, and on submarginal space ; lines black, fine, rather clear ; basal strongly angulate wavy ; outer angulate sinuous ; marginal line of blackish spots ; hind wings smoky white, with dark margin.

Texas ; taken July 7. The type number of the National Museum specimen is 4710.

Maricopa albocostella, n. sp.

Expands 16-18 mm. Palpi blackish ; thorax smooth bluish gray ; abdomen ochre fuscous ; fore wings, anterior one-third whitish with a vinous tint, somewhat mixed with dark scales, the rest of the wing wine fuscous, the vinous colour being strongest close to inner margin ; discal spots large, black ; hind wings fuscous, margin blackish.

Anglesea, N. J. ; from Dr. John B. Smith ; taken Aug. 21 to 24.

Myelois dulciella, n. sp.

Expands 14 mm. Palpi and front dark fuscous ; thorax light fuscous ; abdomen fuscous, interlined with light fuscous, the first two segments gray fuscous ; fore wings of a clear light blue-gray colour ; lines fine, black, distinct, the basal rounded, bent, reaching well out on inner margin, broken at subcostal vein ; within this line, nearer inner margin, is a large rounded reddish spot, and this is edged basally, and rather heavily, with black ; outer line heaviest at costa, strong, bent, angulate ; outer field with a reddish band next to outer line ; marginal line of black dots ; discal spots black, distinct, superimposed ; hind wings light smoky colour, veins and margin somewhat darker.

Hastings, Fla. ; from Mr. Kearfott ; taken Oct. 26.

TENTHREDO—NEW SPECIES.*

BY ALEX. D. MACGILLIVRAY, ITHACA, N. Y.

1. Antennæ black..... 2.

Antennæ rufous :

Black, with the following parts rufous : the antennæ, a spot on the cheeks, the tegulæ, the wings, especially at base, and the front and middle femora, on the femora shading to blackish ; with the following parts yellow : the clypeus, the labrum, the mandibles except at apex, the scutellum, the trochanters, the tibiæ, except the apices of the posterior pair which are brownish, the tarsi, the sides and a narrow margin to the basal plates, and a spot above the posterior coxæ ; the clypeus broadly emarginate ; the third segment of the antennæ twice as long as the fourth ; the front flat between the antennæ. Length, 11 mm. Habitat—Amherst, Massachusetts (Prof. C. H. Fernald).....*Fernaldii*, n. sp.

2. Head more or less yellow above the base of the antennæ..... 3.

Head black above the base of the antennæ..... 4.

3. Posterior femora black above :

Greenish-white, with the following parts black : the antennæ, a five-lobed spot on the vertex, three of the lobes being above the base of the antennæ and another at each meso-caudal angle of the eye, the back of the head, a transverse band on the pronotum, the median lobe of the mesonotum except the V-spot, the lateral lobes except a minute dash on their cephalic half, the metathorax except its scutellum and the posterior part, an oblique band on the suture between the mesopleura and the metapleura, a four-lobed spot on the disc of the basal plates, a fuscous spot on each side of the meson of the first tergal segment, the caudal margin of the metapleura, the bases of the coxæ, and the middle and posterior femora above ; the wings are very slightly fuscous, the apex of the stigma and the veins black, the costa yellowish and distad of the stigma greenish ; the clypeus squarely emarginate ; the third segment of the antennæ one-third longer than the fourth ; the posterior legs beyond the femora and the abdomen beyond the third segment

*See Journ. N. Y. Ent. Soc., V., 1897, 103-108, where the remaining species that I have described are arranged analytically.

rufous. Length, 11 mm. Habitat—Ithaca, New York (R. L. Junghanns). *causatus*, n. sp.

Posterior femora rufous :

Yellowish, with the following parts black : the antennæ, a spot on the vertex with narrow lateral dilations along the caudal margin of the head, the apices of the mandibles, two narrow parallel dorso-ventral lines on the caudal aspect of the head, a transverse band on the pronotum, a spot on the median and lateral lobes of the mesonotum, the suture between the mesonotum and metanotum, a lobate spot on the disc of the basal plates, a spot on each side of the meson of the first abdominal segment, a dot at the base of the middle femora, a spot on the posterior coxæ and each segment of the posterior trochanters and another at the base of posterior femora ; the abdomen and the middle and posterior legs rufous ; the wings hyaline, the veins and the stigma black except the base of the stigma and the costa, which are pale ; the clypeus squarely truncate ; the third segment of the antennæ one-third longer than the fourth. Length, 12 mm.

Habitat—Ithaca, New York (R. L. Junghanns). *rubripes*, n. sp.

4. Abdomen in part pale. 5.
- Abdomen wholly black 16.
5. Pleura with a light spot. 6.
- Pleura not with a light spot, black. 8.
6. Pectus pale. 7.

Pectus black :

Black, with the following parts yellowish : the clypeus, the labrum, the mandibles except at apex, the cheeks, the tegulæ, the collar, the ventral margin of the pronotum, a line on the pleura, a spot above the posterior coxæ, the basal plates except at middle, the suture between the mesopleura and metapleura, the front and middle legs except a black line above which reaches to the apices of the tibiæ, the posterior coxæ except a black spot above and beneath, the posterior trochanters except above, the posterior femora and tibiæ except above, and with the black greatly dilated at the apices of each of the segments ; the posterior tarsi black except the apical segment ; the abdomen rufous except the first tergal segment ; the wings slightly

infuscated; the veins, including the costa and the stigma, black; the clypeus widely emarginate; the third segment of the antennæ about one-fourth longer than the fourth. Length, 12 mm. Habitat—Ithaca, New York (R. L. Junghanns).....
.....*Junghannsii*, n. sp.

7. Posterior tibiæ in great part and tarsi, black:

Black, with the following parts yellowish: the clypeus, the labrum, the mandibles except at apex, the cheeks, the collar, the tegulæ, the ventral portion of the pleura, the pectus, a spot above the posterior coxæ, the coxæ and trochanters except a black line above, the anterior femora and tibiæ except a narrow black line above, and the anterior tarsi; the following parts rufous: the middle and posterior femora except a black line above, the middle tibiæ except an elongate spot above at apex, the middle tarsi except a black line above, the posterior femora except a black line above, the posterior tibiæ except the apical three-fourths, the sternal abdominal segments as far as the seventh, and the tergal segments two to five; the wings are very slightly infuscated; the veins brownish; the stigma and costa black; the clypeus squarely truncate; the third segment of the antennæ one-third longer than the fourth. Length, 11 mm. Habitat—Franconia, New Hampshire (Mrs. Annie Trumbull Slosson).....*Slossonii*, n. sp.

Posterior tarsi and tibiæ rufous:

Black, with the following parts yellowish: the clypeus, the labrum, the mandibles except at apex, the cheeks, the sides of the basal plates, and a spot above the posterior coxæ; the following parts rufous: the collar, the tegulæ, the pleura, the pectus, the legs except a black line above on the coxæ, trochanters, and femora, and the abdomen, including the venter; the wings are hyaline; the veins, including the costa and the stigma, luteous; the clypeus roundly emarginate; the third and fourth segments of the antennæ subequal in length. Length, 10 mm. Habitat—Washington (Prof. C. V. Piper).....*sicatus*, n. sp.

8. Pectus pale.....*rufostigmus*, MacG.
Pectus black..... 9.
9. Posterior femora wholly pale..... 10.
Posterior femora wholly or in great part black..... 13.

10. Cheeks marked with white. 11.
 Cheeks black.....*atravenus*, MacG.
11. Scutellum and legs yellow :
 Black, with the following parts yellowish-white : the clypeus, the labrum, the mandibles except at apex, the cheeks, the palpi, the tegulæ, a large spot on the collar, a spot above both the anterior and posterior coxæ, the apices of the coxæ, the legs beyond the coxæ (some of the tarsal segments are slightly rufous), the scutellum, the basal membrane, the basal plates, tergal segments one to four except a black line on their middle at base, the sides of segments five and six, and a narrow margin on the sides of those ventral segments whose tergums are wholly or in part pale ; the clypeus squarely emarginate ; the third segment of the antennæ one-third longer than the fourth ; the wings hyaline, yellowish ; the veins brown ; the costa and the stigma at base, luteous. Length, 12 mm. Habitat—Olympia, Washington (Trevor Kincaid).....*olivatifipes*, n. sp.
 Scutellum black, the legs rufous. 12.
12. Tegulæ yellowish-white ; abdomen rufous beyond the third tergal segment.*aequalis*, MacG.
 Tegulæ rufous ; abdomen rufous beyond the first segment :
 Black, with the following parts yellowish : the clypeus, the labrum, the mandibles except at apex, a lunate mark on the cheeks, a triangular spot between the antennæ sometimes absent, the collar, and a spot above the posterior coxæ ; the following parts rufous : the tegulæ, the legs except the bases of the coxæ and the sutures of the trochanters, the venter of the abdomen except the sheaths of the ovipositor, and the tergal abdominal segments beyond the first ; the wings infuscated, the veins and stigma black, the costa rufous ; the clypeus squarely emarginate ; the third segment of the antennæ one-third longer than the fourth. Length, 12 mm. Habitat—Olympia, Washington (Trevor Kincaid).....*lunatus*, n. sp.
13. Posterior tibiæ in part pale. 15.
 Posterior tibiæ black..... 14.
14. Posterior femora wholly black.....*remotus*, MacG.
 Posterior femora rufous, with a black line above :

Black, with the following parts yellow: the labrum, the clypeus, the mandibles except at apex, a spot on the cheeks, a spot on the collar, the tegulæ, a spot above the posterior coxæ, the anterior legs, including the coxæ, before, the middle coxæ and trochanters beneath, the knees of the middle legs beneath, and the middle tibiæ and tarsi beneath; the following parts rufous: the middle femora beneath, the posterior femora except a spot at the base and apex above, the posterior tarsi, and the abdomen beyond the third segment; the third segment of the antennæ one-third longer than the fourth; the clypeus deeply emarginate; the wings hyaline, yellowish; the veins black; the costa reddish; the stigma luteous at base. Length, 10 mm. Habitat—Grangeville and Lewiston, Idaho (Prof. J. M. Aldrich).....*rubrisommus*, n. sp.

15. Spot above the posterior coxæ and the sides of the basal plates yellow.....**terminatus*, MacG.

Spot above the posterior coxæ wanting and the sides of the basal plates black:

Black, with the following parts rufous: the front femora except a black line above interrupted at middle, the middle and posterior except a black line above, the tibiæ except a black spot on the apex of the posterior pair, more pronounced beneath, the front tarsi, the apical two-thirds of the first abdominal segment except a black line at apex, abdominal segments two to five, a diamond-shaped mark on the middle of the sixth tergal segment, and the ventral abdominal segments two to five; the clypeus squarely emarginate; the third segment of the antennæ one-third longer than the fourth; the mandibles yellowish-white except at apex; the wings fuliginous; the veins, including the costa and the stigma, black. Length, 11 mm. Habitat—Olympia, Washington (Trevor Kincaid)..*nigricoxi*, n. sp.

16. Legs black varied with white or yellow.....17.
 Legs rufous varied with black.....20.
 17. Posterior tibiæ black.....18.

*A specimen received from Prof. C. V. Piper, and collected at Pullman, Washington, was given the manuscript name *terminoidea*, but on more careful study it does not seem to differ from *terminatus*.

- Posterior tibiæ wholly or in part pale 19.
 18. Tegulæ and sides of basal plates black.... *pallipunctus*, MacG.

Tegulæ and sides of basal plates pale :

Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a triangular spot each side of the collar, a spot on the tegulæ, a spot above the posterior coxæ, the sides of the basal plates, the under side of the anterior femora, tibiæ and tarsi, and the under side of the middle tibiæ and metatarsi; the clypeus squarely emarginate; the third segment of the antennæ twice as long as the fourth; the wings infuscated; the veins brownish, the stigma and costa black. Length, 13 mm. Habitat—Olympia, Washington (Trevor Kincaid).... *alphius*, n. sp.

19. Posterior tibiæ wholly pale :

Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, the palpi, a spot on the collar, the tegulæ, the basal membrane, the sides of the basal plates, a spot above the posterior coxæ, and all the legs beyond the coxæ (the legs become flavescent at apex) except a spot on the apex of the middle and posterior femora above; the clypeus squarely emarginate; the third segment of the antennæ twice as long as the fourth; the wings hyaline, flavescent at base; the costa and the base and the apex of the stigma flavescent; the stigma at middle and the veins brown. Length, 14 mm. Habitat—Vancouver Island (Carl F. Baker).... *subcoerulea*, Es.

Posterior tibiæ black above, pale beneath :

Black, with the following parts whitish: the clypeus, the labrum, the mandibles except at apex, a spot on the cheeks, a line on the collar, the tegulæ, a spot above the posterior coxæ, the front legs beneath, including the coxæ, the middle legs beneath beyond the trochanters except the tarsi beyond the metatarsi, a line on the apex of the posterior femora beneath, the posterior tibiæ beneath, the basal segment of the posterior tarsi beneath, a spot on the apex of the middle and the posterior coxæ, and a spot on the sides of the basal plates; the third segment of the antennæ one-fourth longer than the fourth; the clypeus squarely emarginate; the wings hyaline; the veins, including the costa and the

stigma, black. Length, 9 mm. Habitat—Juliaetta and Craig's Mt., Idaho (Prof. J. M. Aldrich)..... *atracostus*, n. sp.

20. Posterior femora in part black :

Black, with the following parts yellow : the clypeus, the labrum, the mandibles except at apex, a small spot on the cheeks, a line on the collar, the tegulæ, a spot above the posterior coxæ, the front legs beneath, the knees of the middle and posterior legs beneath, and the middle and posterior tibiæ beneath ; the following parts rufous : the front femora behind and at middle, the middle femora beneath and at middle above, and the posterior femora except a linear spot on the base and apex above ; the third segment of the antennæ one-fourth longer than the fourth ; the clypeus broadly emarginate ; the wings hyaline ; the veins, including the costa and the stigma, black. Length, 8 mm. Habitat—Juliaetta, Idaho (Prof. J. M. Aldrich) *Aldrichii*, n. sp.

Posterior femora rufous..... 21.

21. Tegulæ and collar black..... 22.

Tegulæ and collar pale..... 23.

22. Yellow spot above the posterior coxæ..... *nigrisommus*, Harrg.

Yellow spot above the posterior coxæ wanting.. *erythromerus*, Prov.

23. All the tibiæ rufous..... *ruficollis*, Harrg.

Anterior tibiæ black above..... 24.

24. Posterior tibiæ wholly rufous :

Black, with the following parts yellowish-white : the clypeus, the labrum, the mandibles except at apex, a small spot on the cheeks, a spot on the upper posterior angles of the prothorax, the tegulæ, a spot on the ventral margin of the pronotum, a spot above the posterior coxæ, a spot on the sides of the basal plates, a fine line on the posterior margin of the basal plates, a spot on the anterior coxæ beneath, a small spot on the posterior coxæ above near the apex, and the front and middle legs beneath (in some specimens the middle femora are wholly rufous and in some the coxæ are pale at apex) ; the legs beyond the trochanters rufous except a black line above on the anterior and middle tibiæ (in one specimen the black line on the middle

tibiæ is only represented by a black dash), and the middle and posterior tarsi above (in one specimen there is a triangular shaped black spot on the anterior tibiæ above); the clypeus deeply and roundly emarginate; the third segment of the antennæ one third longer than the fourth; the wings hyaline; the costa and the stigma fuscous, the former paler at base. Length, 12 mm. Habitat—Olympia, Washington (Trevor Kincaid).....*nigrifascia*, n. sp.

Posterior tibiæ rufous, with a black line above:

Black, with the following parts yellow: the clypeus, the labrum, the mandibles except at apex, a spot on the collar, the tegulæ, the tibiæ beneath, and a spot above the posterior coxæ; the remainder of the legs rufous except the following: a black spot on the base and apex of the femora (more pronounced on the anterior pair), a black line on the front and middle tibiæ and tarsi above, the posterior tibiæ above, and the posterior tarsi entirely; the clypeus emarginate; the third segment of the antennæ one-third longer than the fourth; the wings hyaline; the veins, including the costa and the stigma, black. Length, 9 mm. Named after Mr. William Allen Savage. Habitat—Juliaetta, Idaho (Prof. J. M. Aldrich).....*Savagei*, n. sp.

The University of Illinois has fallen heir to the Bolter Collection of Insects, numbering approximately fifteen thousand species, represented by about seventy thousand specimens, besides thirty thousand duplicates not in the systematic collection. This collection, accumulated during the last fifty years by the late Andreas Bolter, a business man of Chicago, is remarkable for the excellence of the material and for the exquisite care with which it has been prepared and arranged. It represents all orders of insects and North America in general, and contains also a considerable amount of exotic material. The gift was made by the executors of Mr. Bolter, in accordance with the terms of his will, conditional upon its maintenance as a unit, under the name of the "Bolter Collection of Insects," and in a fireproof building.

The Entomological Society of Ontario has been placed under obligation to Mr. C. T. Ramsden, of Santiago de Cuba, for the gift to its collection of a specimen of the strange genus *Ascalaphus*, in the *Myrmeleonidae*, which is in itself a great curiosity, as well as being scientifically valuable.

J. ALSTON MOFFAT, Curator,

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND
PARASITIC WASPS, OR THE SUPERFAMILY
VESPOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS,
U. S. NATIONAL MUSEUM.

(Paper No. 2.—Continued from page 155.)

SUBFAMILY I.—Pepsinæ.

To this subfamily belong the giants of the family, although many species in it are of moderate or insignificant size. Here belong the "Tarantula Killers," or Pompilids, belonging to the genus *Pepsis*, large, brilliantly-coloured species, often with fiery red wings, or blue or black wings marked with white or red, etc., that prey upon the genuine Tarantulas and other large species of spiders.

The species belonging to this group are at once distinguished from all others, except the *Ageniinae*, by *the second ventral segment in both sexes being traversed by a transverse grooved line, impression or emargination*. This transverse grooved line, or emargination, is present in *no* other group, except in the females belonging to the *Ageniinae*, but these are readily distinguished by their smooth hind tibiæ, which are always simple, *without teeth or spines* and *without* a longitudinal ridge. In the Pepsinæ the hind tibiæ in the females are most frequently toothed or serrate, as well as distinctly spinous; but very rarely simple, *without* teeth or spines, but in the few genera without these characteristic features the hind tibiæ have a longitudinal ridge or carina, not possessed by the *Ageniinae*.

Table of Genera.

- Second cubital cell receiving the first recurrent nervure *much before* the middle, or near its basal angle. 2.
Second cubital cell receiving the first recurrent nervure, *at or beyond* the middle, very rarely *a little* before the middle. 3.
2. Wings ample, extending far beyond the tip of the abdomen; second cubital cell larger than the third
Hind tibiæ in ♀ strongly serrated; ocelli placed in an obtuse triangle; mandibles bidentate; maxillæ normal; hind tibiæ in ♂ simple, *not* serrate, the tarsi compressed, flat, the basal joint usually curved or bent; fourth or fifth ventral segments with long bristles, often in two groups; claws with a tooth before middle. (1) *Pepsis*, Fabr.
(Type *P. ruficornis*, Fabr.)

Hind tibiae in ♀ smooth or nearly; ocelli triangularly arranged; mandibles 4-dentate; maxillae at base with two long divergent brushes of pale hairs; claws with a median tooth

beneath.....(2) *Dipogon*, Fox.
(Type *D. populator*, Fox.)

Wings much abbreviated, *not* extending to tip of abdomen; second cubital cell smaller than the third; submedian cell longer than the median; cubitus in hind wings originating beyond the transverse median nervure; claws with one tooth beneath..... (3) *Sphictostethus*, Kohl.
(Type *P. Gravesii*, Hal.)

3. Submedian cell in front wings *not* longer than the median or *clearly* shorter, the transverse median nervure interstitial with the basal nervure, or uniting with the median vein *before* the origin of the basal nervure.....9.

Submedian cell in front wings distinctly *longer* than the median, the transverse median nervure uniting with the median vein *beyond* the origin of the basal nervure.

Marginal cell pointed at apex; claws *not* cleft, but with one tooth beneath; inner angle of first discoidal cell *without* a glabrous spot at base, or only faintly indicated.....7.

Marginal cell broadly rounded, or squarely or obliquely truncate at apex; inner angle of first discoidal cell *with* a distinct glabrous spot at base (rarely wanting).....4.

4. All claws cleft, or *with* one or more teeth beneath.....5.
Front claws alone cleft, the others with a tooth beneath.....(4) *Heteronyx*, Sauss.

5. Marginal cell scarcely thrice as long as wide, the first recurrent nervure received by the second cubital cell beyond the middle or towards apex, but considerably *before* the second transverse cubitus; claws cleft.....6.

Marginal cell very long, four times, or nearly, longer than wide; first recurrent nervure interstitial, or *very nearly*, with the second transverse cubitus; inner angle of first discoidal cell usually with a glabrous spot; cubitus in hind wings originating before the transverse median nervure (rarely interstitial).

Claws with *one* tooth beneath; outer ridge on hind tibiae in ♀ distinctly serrate, the face with short, stiff bristles.....(5) *Mygnimnia*, Shuckard.
(Type *M. flava*, Fabr.)

- Claws with *two* teeth beneath in ♂ cleft; metanotum with a tubercle on each side of the spiracles, otherwise as in *Mygnumia*..... (6) Hemipepsis, Dahlb.
(Type *H. capensis*, Dahlb.)
- Claws with *four* teeth beneath and closely and longly combed with bristles; outer ridge on hind tibiae in ♀ simple, not at all serrate (Africa)..... (7) Tetraodontonyx, Ashm., n. g.
(Type *T. rufipes*, Ashm., m. s.)
6. Front tibiae spined above, the front tarsi with a long comb, consisting of 7 or 8 long spines; hind tibiae and tarsi armed with large spines. Second and third cubital cells small, the third the smaller of the two..... (8) Schiztonyx, Sauss.
Front tibiae not spined above, the front tarsi armed with short spines; hind tibiae and tarsi armed with small spines arranged in rows; second and third cubital cells large, the third the larger of the two..... (9) Cyphononyx, Dahlb.
7. First recurrent nervure received by the second cubital cell *at*, near, or a little beyond the middle, but rarely as far as its apical third, the second recurrent nervure received by the third cubital cell before its middle..... .8.
First recurrent nervure received by the second cubital cell *near* its apex, or at or beyond the apical third; submedian cell much longer than the median; wings ferruginous, margined with black; cubitus in hind wings interstitial with the transverse median nervure..... (10) Pallosoma, Lepel.
(Type *P. barbara*, Lepel.)
8. Cubitus in hind wings *interstitial* or originating a little before the transverse median nervure; eyes *not*, or only slightly, convergent above; clypeus with the anterior margin more or less distinctly sinuate medially (rarely truncate), the labrum slightly exposed.
Front tarsi *with* a comb; hind tibiae in ♀ strongly serrate, in ♂ with short, indistinct spines; second cubital cell receiving the first recurrent nervure near its apical third..... (11) *Salix* Fabricius.
= *Priocnemis*, Schiödte (pars).
= *Priocnemoides*, Sauss.
- Front tarsi *without* a comb; hind tibiae in ♀ *not* serrate, or with only slight traces of teeth, but with some short, stout spines, in ♂ *without* or at most with very short, feeble

- spines; second cubital cell receiving the first recurrent nervure at or only a little beyond its middle..... (12) *Calopompilus*, Ashm., n. g.
(Type *P. maculipennis*, Smith.)
- Cubitus in hind wings originating *beyond* the transverse median nervure, or at least somewhat beyond it, never interstitial; clypeus squarely truncate anteriorly; second cubital cell receiving the first recurrent nervure *at* or a *little before* its middle..... (13) *Hemipogonius*, Sauss.
(Type *H. venustipennis*, Sauss.)
9. Submedian and median cells in front wings equal the transverse median nervure, *interstitial* with the basal nervure.
Pronotum as long or longer than the mesonotum 11.
Pronotum distinctly shorter than the mesonotum. 10.
10. Eyes convergent above; pronotum anteriorly abruptly truncate; first recurrent nervure joining the second cubital cell a little beyond the middle; claws with a tooth beneath; cubitus in hind wings interstitial. (14) *Calicurgus*, Lepel.
(Type *C. fasciatellus*, Lep.)
11. First recurrent nervure received by the second cubital cell *at* or *near* its middle; cubitus in hind wings interstitial, or nearly, with the transverse median nervure. (15) *Ferreolomorpha*, Ashm, n. g.
(Type *Priocnemis pedestris*, Smith.)

THE GENUS CATOCALA.

BY G. H. FRENCH, CARBONDALE, ILL.

It is 16 years since the Rev. G. D. Hulst undertook a revision of this genus along the lines of "Structural Characters." As a new Check List of the moths is to be published soon, it seems proper that another arrangement of the genus be made. The structure of the genitalia as a basis of the separation of the species has been regarded by many eminent lepidopterists as of doubtful value. It is certain that in this genus its use was not warranted by larval characters or field observation. For these reasons the last revision has not been satisfactory to those who were familiar with many species in their native haunts, or who had bred them. The writer does not say, however, that the present revision will be faultless, for as yet too few of the species are known in their adolescent stages

to make this much of an aid in classification. It is now a question whether certain forms are valid species or mere varieties, and this can be settled only by further observation or breeding. Many species have a wide range of variation, such as *Lacrymosa*, but the intergrades and varieties in this species are all well known, and the characters are so strongly marked in all the forms that we need not hesitate with this species. Other species, as *Epione* and *Sappho*, are remarkably uniform in their markings, even when from widely-separated localities. Of the validity of these species there is no question, even without breeding. Of some of the others, it seems better to retain their names as species till they are proven otherwise. The closet naturalist is not always able to judge in such cases. Even so good a botanist as Dr. Asa Gray was led astray in at least one instance known to the writer by not knowing his plant in the field.

In regard to sequence, there seems to be no reason why the smaller species should be regarded as the highest. If activity counts for anything, then *Epione* certainly stands at the head of the list. Unless we change the usual generic description, *Allotria Elonympha*, *Andrewsia Belfragiana* and *Parthenos Nubilis* are not *Catocalæ*.

In the December number of the CANADIAN ENTOMOLOGIST for 1892, page 308 of Vol. 24, it was shown that too little was known of the larvæ to use them as a basis of classification in this genus. As a rule they are striped longitudinally, but one species, *Illecta*, has its larva striped transversely. Generally there is a lateral fringe along the sides of the larvæ, but three species, *Obscura*, *Innubens* and *Illecta*, were known not to have this fringe, 15 species having it. As these differed widely in size, colour and markings of the imagines, this character would be of little value in classification. For this and other reasons it seems best to follow the general practice and take the colour of the hind wings as the basis of division of the genus into groups. In this paper the writer will consider only the black-winged species.

As to the two species, *Viduata* and *Vidua*, we see no good reason for relegating the former to synonymy. There are numerous instances where names in the same genus in our catalogues are the same except for a slight difference in the termination. From Kirby's Catalogue of the Diurnal Lepidoptera we have *Anthocaris Ausonia* and *Ausonides*, and *Papilio Xuthus* and *Xuthulus*, and a number of others might be cited. In his Catalogue of the Heterocera, Vol. 1, published in 1892, we find Kirby

following the same practice: as *Amorpha Populi* and *Populeti*, *Miltochrista Rosaria* and *Rosacea*, etc. It is also not a very uncommon thing to see the same name used in a family in related genera without any change. As an instance of this, in Dr. Skinner's new catalogue of "North American Rhopalocera," 1898, we find *Diadema Misippus*, and in the next genus *Limenitis Misippus*. In these species the female of the first is coloured and marked so much like the second in both sexes that they might easily be mistaken for each other by an amateur. Yet the writer has seen no criticism on Dr. Skinner's course in the use of these names. The same thing was found in a catalogue of Star Fishes, where the specific name *Miliaris* was used in two related genera of the same family. However much we may regret that names with only a slight difference in termination have been used, or the same name for two species in related genera of a family, when the names have been published and used it seems best to the writer to let them alone. Indeed, I do not believe any one has a right to change them. In the case before us there is no danger of confounding *Viduata* and *Vidua*, for the two insects are very different.

In regard to the two names, *Judith*, Strecker, and *Levettei*, Grote, the dates of the published papers in which the descriptions occur give Strecker's name the priority. We have decided to take the "face of the returns" as evidence in this case without taking up the differences of the two authors.

In looking over the collection of Dr. William Barnes, of Decatur, Ill., a new species was found which the Doctor kindly placed at my disposal. In the description that follows, the writer has dedicated the species to its owner by the use of his name for the species.

Catocala Barnesii, nov. spec.

Expanse, 2.63 inches. General or ground colour of the fore wings rather dark olive gray, not so dark as that of *Obscura*, but between that species and the colour of *Robinsonii*, the lines faint and much the same as they are in the latter species, the insect in general reminding one of *Robinsonii*, but it is smaller and darker, standing in size between *Robinsonii* and *Judith*. Comparing the markings with those of *Robinsonii*, the t. a. line is oblique, reaching the posterior margin close to the t. p. line as in *Robinsonii*, but the costal portion is heavier; the shade over the reniform is rather heavy; the reniform with only the inner part of its ring visible. This portion black, the rest concolorous, while in *Robinsonii* the reniform is brown; subreniform whitish, closed or nearly so, in colour paler than in *Robinsonii*, and in that species it is wide open; t. p. line

with its two extra-discal teeth about half as acuminate as in *Robinsonii*, in the latter the anterior often extends across the subterminal space; s. t. line scarcely discernible, much less brown in the s. t. space than in its ally, almost concolorous. The ground colour of *Robinsonii* is pale gray with a slight bluish sheen as seen in its side light, that of *Barnesii* has a slight purplish sheen in a side light.

Hind wings black, fringe white with a slight ochraceous tinge at base, black at the ends of the veins. The under side as in *Robinsonii*, but more smoky in tinge.

Described from two examples from San Antonio, Texas; in the cabinet of Dr. Wm. Barnes, Decatur, Ill.

The writer would arrange the black-winged species of the *Catocalæ* of the United States as follows :

- | | |
|-------------------------|--------------------------------|
| Catocala, Schrank. | 10. Flebilis, Grote. |
| 1. Epione, Drury. | 11. Robinsonii, Grote. |
| 2. Sappho, Strecker. | var. Curvata, French. |
| 3. Agrippina, Strecker. | 12. Barnesii, French, nov. sp. |
| 4. Subviridis, Harvey. | 13. Obscura, Strecker. |
| 5. Lacrymosa, Guenée. | var. Simulatilis, Grote. |
| var. Ulalume, Strecker. | 14. Residua, Grote. |
| var. Paulina, Hy. Edw. | 15. Insolabilis, Guenée. |
| var. Emilia, Hy. Edw. | 16. Angusi, Grote. |
| var. Evelina, French. | var. Lucetta, Hy. Edw. |
| var. Zelica, French. | 17. Judith, Strecker. |
| 6. Viduata, Guenée. | Levettei, Grote. |
| Maestosa, Hulst. | var. Miranda, Hy. Edw. |
| 7. Vidua, A.-S. | 18. Tristis, Edw. |
| Desperata, Guenée. | 19. Elda, Behrens. |
| 8. Dejecta, Strecker. | 20. Relicta, Walker. |
| 9. Retecta, Grote. | var. Bianca, Hy. Edw. |
| var. Luctuosa, Hulst. | var. Phrynia, Hy. Edw. |

A NEW CATOCALA FROM TEXAS.

BY A. RADCLIFFE GROTE, ROEMER MUSEUM, HILDESHEIM, GERMANY.

Catocala moderna, n. sp.

Allied to *C. viduata*, Guenée, but very much smaller, and at once distinguished by the pale angulated band of the under surface of hind wings reflecting through on upper surface, where it appears as a faintly yellowish mesial shade, distinctly outlined. Fore wings like *C. viduata*, of the same pale gray, with the black oblique shading running from costa at centre of median space outwardly to below apices, less marked than

in its ally. Subreniform paler, more yellowish. Else the lines and markings copy in miniature its ally. Fringe to secondaries white. Collar darker, with black line; thorax pale gray.

Expanse 70 mil. *Hab.*—Dolores, Texas.

Accompanying the fresh type are examples of *C. viduata*, Guen. (= *maestosa*, Hulst. Guenée considered his name sufficiently distinct from *vidua*, and adopted it for that reason), which expand 95–98 mil. I know of no black-winged *Catocala* in which the mesial band shows so plainly.

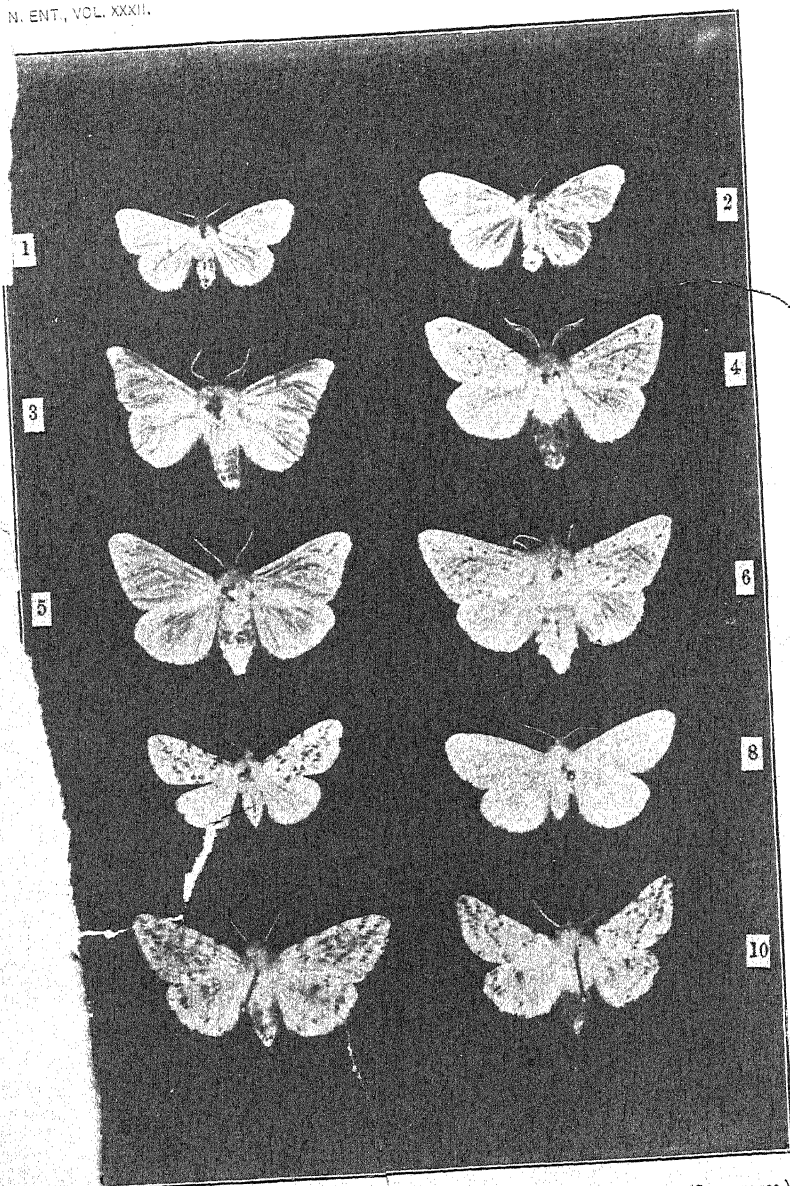
In this same collection is a fresh ♀ example of *Eacles imperialis*. var. *nobilis*, Neum., with the wings all suffused with russet; also one of var. *didyma*, Beauv., not recorded by Dyar. Yellow, with both wings terminally entirely russet, outside of the undulate pale purple band. My recollection of the work of De Beauvois is that he figures this form. The antennæ in the figure are incorrect; from having been broken off his type, the author was induced to effect a restoration in his figure not agreeing with reality. There is also a larva of a *Citheronia*, which does not well agree with alcoholic specimens of *C. regalis*, and may be *C. Mexicana*.

BOOK NOTICE.

STORIES OF INSECT LIFE (Second Series).—By Mary E. Murtfeldt and Clarence M. Weed. Ginn & Co., pp. 72, 1899.

Reliable books about insects, written so that children can understand them and will be interested, are few in number. The little work now under consideration fulfils its purpose admirably, and will doubtless be very useful in fostering a taste among children for insect life. The information given is accurate and well selected. Moreover, it is presented in an earnest, attractive manner, which will create a desire for more knowledge, and, with that desire, an inclination to seek for it where best it can be found, in the open field, by personal observation. The present booklet is intended as a companion to a similar publication of 54 pages, which appeared last year. Both are well and freely illustrated. The insects chosen for description are common objects of the country, just such as a child would wish to know about. The aim of the authors was well conceived, and has been well carried out. They say: "This little book is designed for use as a reading book, which shall lead the pupil to fuller observation upon the insects about him. It is not essential that the articles be read consecutively; but it is highly desirable that the pupils actually see as many as possible of the insects discussed." "The study of living insects should always have the first place in school work. The aim of the teacher should be, not to foster the collecting spirit so much as to develop the perceptive faculties in such a way that the pupil will not only notice the things about him, but will be on the alert for the significance of their structure, their colour or their habits of life." J. F.

Mailed May 31st, 1900.



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CONTENTS.

| | | | |
|--|-----|--|----------|
| Fyles—The "Entomological Muddle"..... | 193 | Webster—Diptera from wheat fields..... | 212 |
| Ball—Some new Jasside..... | 200 | King—Coccidæ of the Ivy..... | 214 |
| Bogue—A new species of Kermes..... | 205 | Osborn—New species of <i>Hæmatopinus</i> | 215 |
| Baker—Notes on <i>Idiocerus</i> | 207 | Book Notice—Grote's <i>Systema Lepidop-</i> | |
| Beutenmuller—New <i>Sesia</i> from Alaska..... | 208 | <i>terorum Hildesie</i> | 216 |
| Grote—Types of Noctuid genera..... | 209 | Personal Notes..... | 213, 216 |

THE "ENTOMOLOGICAL MUDDLE" — A REJOINDER.

BY THE REV. THOMAS W. FYLES, SOUTH QUEBEC.

I thought I had "said my say" on the *Cunea-Congrua* question, but Mr. Lyman's attack upon me demands a reply.

Mr. Lyman has made a military allusion in rather questionable taste. I would remind him that the reason the Boers have *stuck to their guns* is that, until now (May, 1900), their opponents have not been able to capture their guns, but have, on the other hand, furnished the Boers with new artillery and fresh stores of ammunition.

Mr. Lyman has supplied me with new proofs that *cunea*, Drury, and *punctatissima*, S. & A., are not identical—proofs that I think will be convincing to every candid reader. I shall set them forth in due course.

I will arrange the remarks I have now to offer as I did those which I made in the March number of this year's ENTOMOLOGIST.

I.—Concerning the identity of *congrua*, Walker, with *antigone*, Strecker.

Mr. Lyman thinks it probable that I am right in maintaining that *antigone*, Strecker, is only a synonym of *congrua*, Walker; but he thinks also that two clauses in my summary of evidence brought before us—viz.:

(c) Dr. Hulst and others have bred it.

(d) *S. antigone* has been found to be identical with it—"too positive to be scientific." Why? Dr. Hulst described the larvæ under the name of *congrua*, and the larvæ I raised were unquestionably of the same kind as his, and these produced moths which tally in every particular with the description given by Grote and Robinson (see description on page 123 of the May number), several of them having the S-like mark

which Mr. Lyman has never seen; and this description was made by Grote from two of Walker's types which he saw and handled, and which bore Walker's own identification marks; and Messrs. Dyar and Beutenmuller have declared the moths, raised as above mentioned, to be identical with *S. antigone*, Strecker; and Walker's name of the species has the priority. What more would Mr. Lyman have? Does he think we should be any better off if he himself had seen Walker's types and described them?

II.—Concerning Riley's theory.

I may truly say that I was an entomologist before Mr. Lyman was born, and it seems to me "only the other day" that Prof. Riley propounded his theory that "many names," of which he instanced four, viz., *cunea*, Drury; *textor*, Harris; *punctata*, Fitch, and *punctatissima*, S. & A., were merely synonyms—the first of the four having the priority. Up to that time no one had thought of calling the moth from our Northern Fall Web-worm anything but *textor*. Walsh and Riley so designated it in Vols. I. and II. of the "*American Entomologist*"; so did Packard in his "Guide"—my copy is one of the 7th edition, published in 1883; and Saunders, in his "*Insects Injurious to Fruits*," published in the same year.

Riley had done good work as an entomologist, and men were disposed to accept his teaching without question. Dr. Smith adopted it, and "Smith's List" has been the guide of our younger entomologists. Hence the use of *cunea* to designate the moths from Fall Web-worms.

But I maintain that when I spoke of *Bombyx cunea*, Drury, no one had a right to assume that I meant something else—that I meant (to adopt Dr. Dyar's formula) *cunea*, Riley (nec Drury).

If no one till now has questioned the identity of *cunea*, Drury, and *punctatissima*, S. & A., it has been because no one has had the reason for questioning it that now exists, viz., the discovery of an insect that more closely answers to Drury's figure and description than *punctatissima* does.

Whether *Hyphantria punctatissima*, S. & A., and *H. textor*, Harris, are identical or not can be easily proved by our Southern entomologists. They have only to breed carefully from eggs of each sort to determine the matter. It will be "too ridiculous" if it should prove that in this respect also we have been misled by Riley—that after all there is but one brood of *textor* in the season, and but one brood of *punctatissima*, and

that these insects are specifically distinct one from the other. In the meantime it *is* surprising that Mr. Lyman, above everybody else, should countenance a question whether these insects are so distinct, for such a question implies a suspicion that *that eminent entomologist, Dr. Riley, confused two or more species of moths.*

It requires considerable courage and self-confidence for a man to assume the rôle of general critic and censor, and a critic should be careful not to misrepresent those whom he attacks. Where is the relevancy, or the correctness, of Mr. Lyman's statement that I overlooked the fact of the priority of the name *punctatissima* over that of *textor*, seeing that, on page 369 in the December number of the CANADIAN ENTOMOLOGIST, I arranged the Hyphantrians thus :

HYPHANTRIA, Harris.

Punctatissima, S. & A.

textor, Harris ?

Again, on page 128 he says, speaking of myself, "He is wrong in implying that Dr. Ottolengui doubted the identity of *cunea*, Drury, and *punctatissima*, A. & S." I implied nothing of the sort.

He continues, "What Dr. Ottolengui expressed a doubt about was whether *textor*, Harris, and *punctatissima*, A. & S., were the same." Is not that what I said? My words were, "By these forms I understand him to mean *punctatissima* and *textor*." Mr. Lyman failed to perceive that I was showing the weakness of Riley's theory in *two* particulars, testing the chain at two points.

It is usually understood that Riley was his own artist (and a very good artist too!). Whether he drew the figures 86 and 87, of which so much has been said, does not appear; but in the figures there are no lines of dimensions, in the letterpress there is no word as to enlargement or inaccuracy. We must therefore conclude that the figures are what Riley intended them to be. Yet Mr. Lyman speaks of the dimensions of Fig. 86 as "absurd," and alludes to inaccuracies in the wing-series. *In fact, I have to thank him for fully sustaining my second contention*, for if, as he says, Riley's series of wing-figures were merely intended to show the *range* of variations of a variable species, how can they be regarded as "a proof amounting to a demonstration" that *cunea*, Drury; *congrua*, Walker; *textor*, Harris; *punctatissima*, S. & A., etc., etc., are one and the same species?

No one supposed, and it was absurd to suppose, that anyone was in danger of supposing that Riley figured only moths coming from a black ground-feeding larva.

III.—Concerning Drury's *cunea* and the Quebec *Spilosoma*.

The discussion of the *Cunea* question was not uncalled for, and has not been unprofitable. It is well that so much information on the subject has been brought together. In this respect Mr. Lyman has done good service. We can now see clearly the slight basis on which the theory of the identity of *cunea* and *punctatissima* has been built, viz., two uncertain references, made long ago, by two old-world entomologists, and the fact that *punctatissima* is a variable species. The references are: "Whether this be the *cunea* of Mr. Drury or not" (Sir James Smith), and "There seems little reason for doubting that this is identical with the *Phalæna punctatissima* of Abbott and Smith" (Westwood). We have no reason to think that either of the writers had seen Drury's types. Upon so trivial a foundation the theory has been built!

Mr. Lyman thinks Smith and Abbot's figure of *punctatissima* admirable, and that it shows perfect bilateral symmetry. Let us see! In the left secondary of the figure there is a black spot near the tip, and behind it, running towards the body, are two others; on the right secondary the three spots run in a line along the outer margin; and this is what Mr. Lyman calls "perfect bilateral symmetry"! He objects to my expression "fancy sketch." Is it then a *reality* that, in the favoured South, imagoes and larvæ of *punctatissima* may be seen on mulberry bushes at one time?

I *had* overlooked Drury's description of *cunea*. I am glad to read it—it strengthens my case. Mr. Lyman gives it in full on page 122. I will quote the English of the description to save the reader the trouble of reference, and that there may be no mistake as to terms. I give the Old Country meanings of ash-coloured and tip:

"Ash-colored, a., between brown and gray, like the bark of ash".....*Reid's Dictionary*.

"Tip, the part where the costa meets the hind margin".....*Stainton's Manual*, Vol I., x.

The description is as follows:

"*Upper side*.—Antennæ pectinated and black. There is no appearance of any tongue. Head white. Back and abdomen ash colour.

Anterior wings white, with a great number of spots, differently shaped, of a sooty black colour. On the external margin are five spots, those nearest the tips being shaped like triangles. Posterior wings white, with a sooty spot on each near the external edge, and a very faint small mark near the exterior angle. *Under side*.—Legs black. Breast and abdomen ash colour. The wings marked as on the upper side."

We may well ask, Would anyone identify *H. punctatissima* by this description? Riley (as Mr. Lyman has said) has given us the "range" of variation of this variable species. He has given us ten representations (there *are* ten—Mr. Lyman did not count correctly). Possibly a hundred more might have been introduced, but Riley gives the *range*. *The extremes are there*. Take *i* and *j* at one extreme of the series, those that have the triangles upon which so much stress has been laid. Do they answer to the description? No; *the triangles are at the wrong end!*

Reference has been made to the name *cunea*. The name *cunea* carries its own meaning. *Cunea* = *cuneia* (Gr.), of, or pertaining to, a dog, and this, with the generic term *Spilosoma* (spotted body), makes up a very fitting appellation for the species.

How *cunea* can *properly* be derived from *cuneus* (L.), a wedge, has not been shown us. As Mr. Lyman says, I have *chosen* to call the *Bombyx cunea* of Drury a *Spilosoma*. I have done so because Westwood and Walker *chose* to call it so; and because we have not the slightest particle of evidence that the insect was an Hyphantrian.

In the January number of the CANADIAN ENTOMOLOGIST for this year, page 16, appear these words from Dr. Dyar: "There can be no manner of doubt of Drury's figure. It represents the spotted form of Hyphantria. The description of the abdomen at the last resort is conclusive." I passed this enigmatical statement by as "one of those things that no fellah can understand." But Mr. Lyman has acted as interpreter. He says: "In the January number of the present year Dr. Dyar very briefly points out Dr. Fyles's error, calling attention to the fact that of *cunea* the abdomen is described as 'concolori nigro-maculato,' the English description saying back and abdomen ash-colour."

Let us see how things stand:

1. a. Walker's *cunea* had the abdomen yellowish, white on the hind borders of the segments and towards the tip.....(B. M. Cat. III., p. 669, n. 7).

- b. Walker's cunea "was doubtless punctatissima".....(Lyman, p. 121, May number).
- 2. a. Drury's cunea has the back and abdomen ash-colour.....(Drury's description).
- b. "There is no doubt of the identity of cunea and punctatissima".....(Riley and Smith).
- 3. a. Drury's figure shows a white abdomen.(Lyman, p. 128, May number).
- b. "There can be no manner of doubt of Drury's figure. It represents the spotted form of Hyphantria".(Dyar, p. 16, January number)

No difficulty whatever is made of the logical conclusions that the abdomen of *punctatissima* is *yellowish, white at the edges and towards the tip*; that it is *ash-colour*; and furthermore, that it is *white*. But when I described the Quebec insect as having an abdomen *yellow* ("yellowish"), *white at the edges and towards the tip*, why then "the description of the abdomen at the last resort was conclusive" (Dyar). Conclusive of what? That Dr. Fyles was in "error" (Lyman). The description should be back and abdomen ash-colour.

However, the difficulty as to the abdomen in the case of cunea can be easily cleared up by a comparison with *congrua*.

Last year I sent a specimen of *congrua* to Washington. When it left me the insect had an abdomen pure white. When it came back to me, the abdomen was ash-coloured. The long fluffy feathers had been shaken off, and only a slight down remained. Other moths of the batch to which this belonged are losing their white clothing. One has the white in patches only, both on the back and the abdomen.

So also as regards my specimens of *S. cunea*, Drury. The male has been to London, Ont., and back (1,200 miles), and has now an ash-coloured abdomen. The female that I mentioned in my first paper still answers to Walker's description. A second female taken by Edgar Walters at Bourg Louis has been less disturbed, and has more white and less yellow on the abdomen. All these specimens were somewhat worn when they were taken, and I think it very probable that originally they had white abdomens, as the specimens of *congrua* had. The abdominal scales and feathers are alike in both insects.

Lest the readers of the CANADIAN ENTOMOLOGIST should be misled by Mr. Lyman's words, "I can see no resemblance beyond the most superficial between his specimen and Drury's figure," I beg to state that Mr. Lyman has never had my specimen in his possession.

The resemblance of the Quebec *Spilosoma* to Drury's is superficial—"most superficial."

The size is the same.

The contour is the same.

The coloration is the same.

The arrangement of the spots is the same.

The triangle is in the right place.

The variation in the abdomen is accounted for, and there is no straining to fit an extreme variety, or a spotless female, into the case.

What the resemblance *internally* may be, I cannot say. I must leave Mr. Lyman to find out. And with this parting shot, I retire from the field—*my guns uncaptured*; my forces unbroken.

DESCRIPTION OF PLATE 4.

The plate is made from an admirable photograph taken by Prof. H. Walters, M. A., Morrin College. The figures of the moths are of the natural size.

Figs. 1 and 2 represent *Hyphantria textor*, Harris. The insects were raised at Levis by myself.

Figs. 3, 4, 5 and 6 show specimens of *Spilosoma congrua*, Walker. One male is all but immaculate—it has a tiny dot at the angle of the second fork of the median nerve. The abdomen of the insect represented was originally pure white; it is now yellow, white at the edges of the segments and towards the tip. The other male represented is more spotted, and has now an ash-coloured abdomen with longitudinal rows of spots. One female answers to Grote and Robinson's description. The other is more spotted.

Figs. 7 and 8 represent a pair of *Hyphantria punctatissima*, S. and A. The moths were sent to me by Mr. H. H. Newcomb, of Boston, and were raised by Miss Emily L. Morton, of New Windsor, N. Y. Miss Morton says of these insects: "I have raised a great many of them, and there is very little variation; the female is invariably immaculate."

In Figs. 9 and 10 a pair of the *Spilosomas* we have had under consideration are seen. The male was taken at Bergerville, Quebec, by Miss Bickell; the female was taken at Bourg Louis, Quebec, by Edgar Walters. In the Plate the black pectinations of the antennæ of the male do not show against the dark background. T. W. F.

[This controversy is now closed, so far as the pages of this magazine are concerned.—ED. C. E.]

SOME NEW JASSIDÆ FROM THE SOUTHWEST.

BY E. D. BALL, FORT COLLINS, COLO.

Phlepsius lascivius, n. sp.—Resembling *altus*, slightly larger and lighter coloured; margin of the vertex black either side of a light tip. Length 6 mm.; width 2 mm.

Head as wide as the pronotum, vertex depressed at the base, anteriorly convex and rounding to the front, the apex slightly angled, hardly half longer than at eye, two and one-half times wider than long, more than half as long as the pronotum, front broad, convex in both diameters, roundly narrowing below; clypeus with the margins straight; elytra rather stout and straight, flaring behind, the claval nervures parallel, not united.

Colour: soiled yellowish white closely inscribed with brownish fuscous. Vertex with an irregular black cloud either side of the white apex, back of this a white crescent, behind which the surface is irrorate with pale fulvous brown, a semi-pupillate spot either side at the base; face heavily irrorate with fuscous, the black clouds of the vertex uniting below the apex, a few light arcs on the front and a light band across the clypeus and loræ; pronotum closely irrorate with fuscous; scutellum washed with dirty fulvous, a pair of black points on the margin on either side; elytra milk white, finely inscribed with fuscous, which is not in irregular lines except on costal and apical margins.

Genitalia: ultimate ventral segment of the female very long, the posterior margin truncate, the median third with a pair of very slight, evenly-rounded lobes, between which there is a distinct notch; male valve very broad, obtusely triangular, plates three times the length of the valve, broad at base, roundly narrowing half their length, then produced as bluntly pointed divergent lobes.

Described from eight females and four males taken at Holly, Pueblo, and Fort Collins, Colo., and Kimball, Neb. Part of the Fort Collins specimens came from back in the mountain gulches.

Phlepsius turpiculus, n. sp.—Resembling *cinereus*, but more heavily irrorate. Pale straw yellow, irrorate with fulvous brown. Length, ♂ 7 mm., ♀ 6 mm.; width, ♀ 2 mm., ♂ 1.5 mm.

Head as wide as the pronotum, vertex but little longer on middle than against eye, half as long as the pronotum, surface convex, passage to the front roundly angulate; front broad above, feebly convex, almost angled at the antennæ; clypeus narrow just before the base; elytra long,

narrowing apically; veins on clavus sometimes tied before the middle, but not converging.

Colour: a dirty creamy yellow, washed and irrorate with brownish fulvous, vertex and face washed and very finely irrorate with dirty fulvous, omitting a light line marking the boundary between them, and a crescent behind the apex of the vertex; elytra rather coarsely and uniformly irrorate, lower side and legs washed with fulvous, scarcely marked.

Genitalia: ultimate ventral segment of the female twice the length of the penultimate, slightly notched in the middle of the posterior margin, either side of which it is slightly sinuated to the rectangular lateral angles; male valve triangular, the margins indented midway to the apex, plates gradually narrowing to half their basal width, then extending as acutely tipped, attingent, finger-like processes four times the length of the valve.

Described from numerous specimens collected at Holly and Fort Collins, Colo., and at Stratton, Neb. This species and *lascivius* have female genitalia much alike in pattern, while the male plates are quite different; those of *turpiculus* resembling *irroratus*, while *lascivius* resembles *nebulosus*.

Phlepsius graphicus, n. sp.—Resembling *superbus*, slightly longer and heavier built, the lobate commissural line distinct. Length 7 mm.; width 3 mm.

Head narrower than the pronotum, vertex sloping, the margin distinct but not compressed; width at base twice the middle length, very slightly longer on middle than at eye, more than half the length of the pronotum; front broad above, rounding to the spatulate clypeus below; elytra long, flaring apically, the claval nervures tied by a cross nervure before the middle.

Colour: ground colour soiled straw yellow, vertex and pronotum irrorate with testaceous, a round spot on either side the vertex at the base, and pupillate spots on the pronotum behind these, a pair of round spots on the scutellum, the apical part light; elytra pale, the nervures and irrorations brownish fuscous, the scutellar margin and a lobate commissural line light, irrorations gathered into fuscous spots along the costa; face heavily irrorate with brownish fuscous; legs light, marked and lined with fuscous.

Genitalia: ultimate ventral segment of the female three times as long

as the penultimate, lateral margins sloping, lateral angles slightly produced and rounding, posterior margin with two rounding teeth on each side of the deep median incision, the outer pair extending obliquely inwards, twice as long as the inner pair; male valve less than half as long as the ultimate segment, semicircular, plates twice the width of the valve, almost semicircular, slightly elongate, the margin fringed with fine white hairs, four strong spines inside the margin on either side.

Described from fourteen specimens from Wray and Fort Collins, Colo., and Kimball, Neb.

Phlepsius cumulatus, n. sp.—Intermediate in size and colour between *graphicus* and *superbus*, lobate commissural line faint. Length 6.5 mm.; width nearly 3 mm.

Head narrower than the pronotum, vertex nearly parallel margined, slightly sloping, passage to the front distinct but not angled, front broader than in *superbus* and not as convex; elytra broad and slightly compressed behind, the irrorations finer and weaker than in *graphicus*.

Colour: yellowish fulvous irrorate with a rich testaceous brown shading to fuscous where the irrorations are thickened up; the anterior margin of vertex with a light line interrupted in the middle by a red point, two fuscous points on the disc of the scutellum, the commissural line faintly lobate; below tawny yellow, the front heavily marked with brownish fuscous, the rest of face and legs maculate.

Genitalia: the ultimate ventral segment of the female two and one-half times longer than the penultimate, cleft in the middle nearly to the base by a triangular notch, either side of which there is another slight notch; from the outer lobe thus formed it rounds off to the base without lateral angles; male valve triangular, plates twice the length of the valve, the sides roundly angulate, the tips slightly angularly divergent, a dark spot at the inner angle at the base, the margin fringed with fine hairs, the submargin with a few white spines.

Described from numerous specimens taken at Fort Collins, Virginia Dale, Pinewood, and Livermore, Colo., all within the mountains, from the first foothills up to 7,000 feet.

Variety *arctostaphylæ*, n. var.—The preceding species was swept as larvæ and adults from Snowberry (*Symphoricarpos* sp.), where it was found in abundance; a little higher up on the mountains a few specimens, along with their larvæ, of a smaller and darker species were taken from

Bearberry (*Arctostaphylos uva-ursi*); superficially they resemble dark specimens of *altus*, but structurally they could not be separated from *cumulatus* with the material in hand.

They are shorter and heavier than *cumulatus*, with short broad elytra which just cover the abdomen. In colour they are a much darker testaceous, shading to fuscous.

Phlepsius albidus, n. sp.—Small, pale greenish white, resembling *Eutettix insana* until closely examined, slightly more robust. Length 4.5 mm.; width 1.25 mm.

Head as wide as the pronotum, vertex flat, slightly sloping, slightly but distinctly angled before, a little over half as long as its basal width, two-thirds the length of the pronotum; front convex in both diameters, scarcely narrowing until just before the apex; elytra moderately long, compressed behind, the claval nervures straight.

Colour: vertex face and scutellum pale, creamy yellow; pronotum with a greenish cast; elytra white, with fine, almost microscopic, greenish fuscous irrorations, a dark point at apex of clavus and a pair at the outer angles of the loræ; beneath greenish white.

Genitalia: ultimate ventral segment of the female about twice longer than the penultimate, posterior margin slightly rounding, two small round lobes faintly outlined at the centre.

Described from four females taken at Pueblo, Colo. In the white colour and the greenish character of the irrorations this species is very distinct from any before described.

Eutettix insana, n. sp.—Form of *modesta* nearly, but smaller, pale, slightly greenish, white, peppered all over, thickest on the elytra, with small round black specks. Length, ♀ 4 mm., ♂ 3.25 mm.; width 1 mm.

Vertex nearly flat, a third longer in the middle than at the eye; three-fourths as long as the pronotum, two-thirds as long as its basal width, rounding to the convex front, which is slightly expanded below the antennal pits, clypeus convex-margined above; elytra moderately long, flaring as in *modesta*, venation rather weak, the claval nervures either coalescing or tied across in the middle.

Colour: vertex and face pale greenish orange, vertex with a few small spots; pronotum olive with scattered dark dots; elytra white, sprinkled all over with small round dots which appear to be on the surface, all below white, somewhat dotted on legs, connexivum and pygofers.

Genitalia: ultimate ventral segment of the female three times the length of the penultimate, angularly excavated from the acute lateral angles half way to the base in the middle, from which arises a strap-like tooth, nearly equalling the lateral angles, its apex rounded; male valve not as long as the ultimate segment, very obtusely triangular, plates broad at base, triangularly narrowing to one-third their original width, then extending as acutely tapering up-turned points.

Described from numerous specimens taken at Pueblo, Colo.

Eutettix stricta, n. sp.—Form of *insana*, but narrower, pale yellow, with a golden reflection, especially in the males. Length, ♀ 4 mm., ♂ 3.5 mm.

Vertex nearly parallel margined, almost twice wider than long, as wide as the pronotum is long, the surface slightly depressed, bluntly rounding to the front, face as in *insana*; elytra rather long, narrowing behind, veins on clavus not united.

Colour: vertex orange or greenish yellow, sometimes a pair of spots behind the apex, face lemon yellow, front with about seven short brown arcs, the upper pair very oblique; pronotum olive or yellowish; scutellum orange, a pair of brown spots on the disc; elytra greenish or golden subhyaline; below lemon yellow, rostrum orange.

Genitalia: ultimate ventral segment of the female two and one-half times the length of the penultimate, the lateral margins narrowing posteriorly, posterior margin truncate, with a broad just noticeable median projection; ovipositor rather long, orange; pygofer narrow, greenish; male valve very short and broad, about half the length of the ultimate segment, plates very broad at base, long triangular, with the acute apices produced and coloured bright orange.

Described from numerous examples collected in Ariz. by Dr. Kunze.

Deltocephalus grammicus, n. sp.—Form of *albidus* nearly, but longer and narrower. Lemon yellow, with six brown stripes on pronotum and elytra. Length 5.25 mm.; width 1.25 mm.

Vertex flat, roundly right angled, a fifth longer than its basal width, over half longer on its middle than against the eye, a fifth longer than the pronotum; face making an acute angle with the vertex, front very narrow, resembling a *Platymetopius*; elytra long, flaring, venation similar to that of *imputans*, obscured by the colour lines, veins on clavus coalescing for one-third their length.

Colour : vertex white, washed with yellow, a crescent either side the point, a dash on the lateral margin and interrupted before the middle, brownish fuscous ; face pale yellow, a narrow black line just under the margin of the vertex ; pronotum yellow, with six dark brown stripes, the inner and broader pair arising behind the middle of the vertex, continuing across the scutellum ; elytra yellow, with five light brown stripes on each side, interrupted by the light nervures, the reflexed veinlets broadly white, lined anteriorly with fuscous ; below pale yellow.

Genitalia : ultimate ventral segment of the female half longer than the penultimate, the posterior margin angularly excavated one-third its depth, margins of the excavation near the centre slightly toothed and marked with black.

Described from three females ; two taken from the Platte valley at Sneyder and Julesburg, Colo., and one from Kimball, Neb. This is a very distinct species, and though unquestionably a member of the reflex-veined Deltoccephalids, still in face characters it recalls a *Platymetopius*, and in colour and ornamentation it might easily be confused with *Athysanus colon* or *texasus*.

A NEW SPECIES OF KERMES.

BY E. E. BOGUE, M. S., STILLWATER, OKLAHOMA.

Kermes trinotatus, n.sp.—Female scale variable in size, averaging about $5\frac{1}{2}$ mm. long, 6 mm. wide, and $4\frac{1}{2}$ mm. high ; rounded above, somewhat flattened behind, convex beneath, front turned down into a more or less beak-like prominence ; median groove obscure or broad and shallow ; colour varies from bright argillaceous to dull gray ; surface uniform, more or less conspicuously speckled with black ; segmentation obscurely or plainly marked with dark spots. When the median groove is present it is crossed with more or less dark lines showing segmentation. There is a rounded dark spot on each side of the front, and an elongated dark blotch extending for a short distance above and below the anal opening : hence the specific appellation.

Larvæ $416\ \mu$ long by half as broad ; caudal setæ $160\ \mu$ long ; antennæ $100\ \mu$ long, 6 jointed, formula (1, 2) (3, 4) (5) (6), 6 longest, 3 and 4 shortest, a few hairs towards tip ; marginal spines conspicuous around the head, a prominent one each side of each caudal seta ; claws of feet simple, slightly curved inward, accompanied by a few hairs. Abundant

in certain localities near Stillwater, Oklahoma, on *Quercus nigra*, and occurs in other regions on various species of *Quercus*. The species is very variable in colour, size and markings, and it is possible that more than one species is included in the description. Further study of larval characters would be necessary to separate them. It seems to be frequent across the continent. I have it from Dr. J. A. Lintner, Albany, N. Y.; Dr. John B. Smith, New Brunswick, N. J.; Mr. W. M. Scott, Atlanta, Ga., and a large number of specimens from Stillwater, Okla. Dr. L. O. Howard wrote me from Washington, D. C., under date of Jan. 5, 1899, that the same species bears their (U. S. Nat. Mus.) numbers 722, 2404, 3705 and 7337, and bears a manuscript name. No. 1097 in collection Okla. Expt. Sta.

The species is one or more of the forms that have passed under the name of *Kermes galliformis*, Riley. Mr. Theo. Pergande kindly compared specimens with type specimens of *Kermes galliformis*, Riley, and has decided them to be very distinct. Dr. Riley's description is not available to most entomologists of to-day, so I should like to record here what he says of it: "*Kermes, galliformis*, n. sp. A new species of oak coccid mistaken for a gall. An esteemed correspondent from Ohio (Dr. John Waider) sends us what he supposed to be some kind of a gall which he found at Iron Mountain, Mo., on twigs of *Quercus palustris*. They are pretty, large, globular, or almost globular, objects fastened to the twigs either singly or in clusters as we are accustomed to see certain Cynipid galls. Their shining yellow surface is handsomely variegated with light brown patches. The particular species sent by our correspondent is undescribed, and may be characterized as follows: Mature female scale, average length 5 mm. Subspherical, usually somewhat broader than long, and often with a broad shallow constriction medio-dorsally. Attached by a broad, dark brown cut or excavation which is covered by a beak anteriorly and notched anally, the brown colour extending to a point above the notch. Polished and smooth. Ground colour pale yellowish, appearing under lens minutely and evenly speckled with brown, more or less suffused or mottled with gray or brown, the constriction when present generally dark. A series of about seven irregular rows of black punctations running across the scale, often connected by an irregular black line, and this again relieved by white or pale yellow. The uppermost row distinct and constant."

The form found at Stillwater, O. T., is considered typical of *K. trinotatus*.

NOTES ON IDIOCERUS (JASSIDÆ).

BY C. F. BAKER, ST. LOUIS, MO.

There has just come into my hands (April, 1900) the paper on this genus by Osborn and Ball in the Proc. Davenport Acad. Sci., Dec., 1898. As some of my conclusions regarding the species of this genus do not coincide with those of the above authors, it may be of interest to present another view.

Verticis, *ramentosus* and *striola* are in the same condition *Deltocephalus Melsheimeri* used to be in: different authors might readily find many different forms that possibly fit the descriptions. Perhaps the types *ramentosus* and *striola* are in existence. I think more harm than good will come of attempts to identify these three forms without further data than the mere descriptions.

Prof. Osborn does not say that he has ever examined the type of *Duzei*. From his description it is apparent that he has not. VanDuzee described the species in MS., and returned the specimen to Provancher, telling him it was new. Provancher promptly published it. This description by VanDuzee has been in my hands for some time. He should have published it. I quote it herewith: "Form and size of *lachrymalis* nearly, the elytra shorter and the sides of the pronotum more rounded off than in that species. Colour brownish fulvous above, pale and more yellowish beneath. Tergum, the narrow edge and hind margin excepted, black; tibiæ and tarsi tinged with fulvous. Elytra hyaline, faintly tinged with smoky; nervures concolorous, obscure, the costal yellowish. Wings faintly smoky-hyaline, iridescent, nervures brown. Transverse impressed line of the scutellum black, angled. Form of the facial pieces very similar to those of *lachrymalis*. Last ventral segment of female feebly trilobate, the median lobe the largest, lateral angles retreating. Pygofers large and stout, much exceeded by the brownish oviduct. Eyes black. Length 6.5 mm." To this description Mr. VanDuzee appended the following note: "The above description was taken from the very example M. Provancher founded his species on. I returned the specimen to him, marked n. sp., and he described it."

To be more exact concerning the oviduct, it is exerted about a third the length of the pygofers. If a careful comparison of this description with the description and figures of *perplexus* be made, it will be seen at once that they cannot possibly refer to the same insect. Prof.

Osborn had not seen the type of *Dusei* nor that of *perplexus*. He knew I had the type of *perplexus*, and I have offered to loan him anything I had. I have specimens of *Dusei* from Colo., however, that are quite typical as to length of oviduct, brown veins in wings and coloration. I did not refer *perplexus* to a varietal form of *pallidus* without carefully sifting all the evidence, but that it should be *Dusei* is an impossibility. The *Dusei* of Osborn becomes a synonym of *perplexus*, probably.

The types of *distinctus* and *mimicus* are in my collection, where they have been since the day names were put on them. So Prof. Osborn's remarks on this point are not exact. My collection is now in the National Museum, where anyone may study these types at their leisure.

Since *productus* was described, I have collected many perfectly-formed, healthy specimens of it, both male and female, and I can only say that they are absolutely uniform in the "remarkable characters" indicated in the original description, and that these characters are most positively *not* "due to the vertex having been pushed forward and crushed along a middle line. If I remember correctly, the type is not a "crushed specimen." Prof. Osborn has not seen the type, though he could easily have done so. I fail to see how crushing could produce the peculiar inflation found in the head of this species.

A NEW SESIA FROM ALASKA.

BY WILLIAM BEUTENMULLER, NEW YORK.

Male.—Head, palpi and thorax entirely black. Abdomen black with a very narrow white ring at the posterior edge of the second and fourth segments. Anal tuft black. Legs black, with the hind tarsi dirty white. Fore wings transparent, with black borders and a broad black transverse mark. Hind wings transparent, with a narrow black margin. Under side of fore wings washed with golden yellow, basally. Hind wings same as above. Expanse, 20 mm.

Habitat.—Kodiak, Alaska, July 20th, 1899.

Type.—One male, No. 5175, Coll. U. S. Nat. Mus; collected by Mr. Trevor Kincaid; somewhat allied to *Sesia rutilans*, but has white bands on the abdomen instead of yellow ones as in that species. The palpi are wholly black, while in *rutilans* they are golden yellow and black. The female is not known.

TYPES OF NOCTUID GENERA.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

I refer the student to papers of mine on this subject in *The Entomologist's Record*, Vol. VI., pp. 27 and 77. The principal types given by me for genera found in North America are as follows :

Agrotis, Hübn., 1806, type : *A. segetum*.

Graphiphora, Hübn., 1806, type : *G. gothica*.

Gortyna, Ochs., 1816, type : *G. micacea*.

Ochria, Hübn., 1816, type : *O. flavago* (ochracea).

Hylena, Hübn., 1806, type : *X. lithoxylea*.

Lithophane, Hübn., 1816, type : *L. socia* (petrificata).

Hadena, Schrank, 1802, type : *H. cucubali*.

Helioscota, Grote, 1895, type : *H. miselioides*.

Acontia, Ochs., 1816, type : *A. malvæ*.

Eustrotia, Hübn., 1816, type : *E. unca*.

Copimamestra, Grote, 1883, type : *C. brassicæ*.

Oligia, Hübn., 1816, type : *O. strigilis*.

I now give the literary evidence for the types of :

Luperina, Boisd., 1829, type : *L. testacea*.

Ledereria, Grote, 1874, type : *L. virens*.

Apamea, Ochs., 1816, type : *A. didyma*.

Hydræcia, Guen., 1841, type : *H. nictitans*, Linn., sp.

Ledereria.

1874. Grote, Bull. Buff. Soc. Nat. Sci., 54. The name is proposed generally for *Luperina*, Led., nec Boisd. The type *virens* is afterwards given in *Entomologist's Record*, VIII., 183 (1896).

Hydræcia.

1841. Guenée, Noct. Eur. Index Meth., Ann. Soc. Ent., Fr., Tom. X, 237 : *cupræa*, *leucostigma*, *micacea*, *nictitans*. No description ; no type given.

These are the original species of *Hydræcia* ; *cupræa* (*cuprea*) is an *Agrotis* ; *leucostigma* was taken afterwards in 1857 by Lederer as type of *Helotrophæ* ; *micacea* became in 1816 type of *Gortyna*, Ochs. ; *nictitans* appears to be hardly generically separable from *micacea*. *Leucostigma* would be therefore type of *Hydræcia*, and *Helotrophæ* falls ; the only alternative is to make *nictitans* type, and elevate this into a genus, which course I adopted in 1874.

1852. Guenée, Species Général, V., 125 : nictitans, luceus, lorea, cuprea, vindelicia, micacea, immanis, stramentosa.

Guenée here adds American species, of which one has hairy eyes (*lorea*); so, following H.-S., I referred it in 1874 to *Mamestra*. *Leucostigma* is placed back in *Apamea* (l. c. 210); the mixture which is *Hydræcia* has lost a *Helotropha* and gained a *Mamestra*, and the scientific value of the term, which was originally = O, is unchanged. *Micacea* is made type, but this species is preoccupied, through Hübner in the Verzeichniss, for *Gortyna*.

1874. Grote, List of the Noctuidæ of North America, Bull. Buf. Soc. Nat. Sci., April, 1874, 18 : nictitans (Linn.), sera, inquæstita, †salicarum (then unknown to me). Type indicated as *nictitans*, and genus correctly dated 1841. The question of whether this genus is valid must depend upon the classifier. It stands or falls with its type. As designated by Guenée in 1852, it would have the same type with *Gortyna*, and, of course, it would fall. To save it by the sacrifice of *Helotropha*, Led., does not seem to me advisable, and, after my action in 1874, perhaps inadmissible.

Apamea.

1816. Ochs., Schm. Eur., IV., 75 : nictitans (oculea), fibrosa (leucostigma), argillacea, unanimis, *didyma*, ophiogramma, bicoloraria, captiuncula, suffruncula, latruncula, strigilis, connexa, testacea, basilinea, infesta, cespitis, graminis, leucographa, bella, umbrosa, cuprea. This mixture, for which no description or type is given, belongs to six or seven Ledererian genera.
1829. Boisd., Eur. Lep. Index Method., 76 : nictitans (Linn.), oclusa, leucostigma (fibrosa), *didyma* (v. nictitans, Esp.), v. ophiogramma, furuncula, captiuncula, suffruncula, latruncula, strigilis, connexa, ? leucographa.
1840. Boisd., Gen. et Index Meth., 116 : strigilis, v. suffruncula, furuncula, captiuncula, Duponchelii, v. microglossa, erratricula, signalis.
- This further restriction would make the genus = *Oligia*, Hübn., type *strigilis*, but this interferes.
1837. Guen., Ann. Soc. Ent., Fr., I. Ser., Tom. 6, 333 : nictitans (Linn.), latruncula, captiuncula, furuncula, suffruncula, ophiogramma, *didyma*, unanimis, gemina, infesta, testacea, Dumerilii.

1841. Guen., Noct. Eur. Index Meth. Ann. Soc. Ent., Fr., I. Ser., Tom. 10: ophiogramma, didyma, unanimis, geminæ. Except the first, which goes to *Oligia*, Lederer's section C, this restriction gives us species belonging to Lederer's section B of *Hadena*, Led., nec Schrank. Hübn. does not use *Apamea*. Further citations have no bearing on the subject of the type, which may be accordingly taken as *didyma*.

The species heretofore classed under *Hadena*, Led., fall to *Xylena* (=Xylophasia), *Helioscota*, *Apamea* and *Oligia*. The European type *Ilarus ochroleuca* is not recognized as American.

Luperina.

1829. Boisd., Europ. Lep. Index Meth., 77: Dumerilii, argillacea, testacea, contribulis, cespitis. One of the above must be type. The use of this term for *virens*, etc., by Lederer is therefore erroneous. For *Luperina*, Led., nec Boisd., type *virens*, the term *Ledereria*, Grote, 1874, should be used. *Testacea* may be taken as type, taking with it *Dumerilii*. *Argillacea* is a var. of *Hadena* (*Dianthæcia*) *luteago*. *Cespitis* is apparently type of *Tholera*; *contribulis* is apocryphal. This generic term, as previously suspected by me, must be used instead of *Apamea*, Led., nec Ochs. The subsequent enlargements of *Luperina* by Boisduval (1840) and Guenée (1841) have no bearing on the question of type. In literature of the North American Noctuid Fauna this name has been seemingly wrongly applied. The existence in our North American fauna of species congeneric with *Luperina testacea* or *Ledereria virens* has not been made out as yet satisfactorily. In all cases, to insure the "scientific" application of the generic name, the type species as here given must be studied and compared with American material. It is very necessary at the moment that this should be done before the issue of a new Catalogue. For this reason I publish the literary evidence so that it may be looked into and, if possible, contradicted or corrected. I had brought the classification of the North American Noctuids into general harmony with Lederer's, so far as structure was concerned. I could not always adopt his generic names, because he had made no literary study of the subject, had taken at times the first name which came to hand in fact, and had repudiated the authority of the Verzeichniss, now acknowledged by almost all writers in England

and America. I believe, with this paper, to have discussed the principal points where Lederer cannot be followed. I may say, in conclusion, that my former use of *Parastichtis*, Hübn., Verz., type *suspecta*, is warranted, since the other species follow *didyma* to *Apamea*, Ochs., 1816, nec Lederer.

SOME SPECIES OF DIPTERA INHABITING OR FREQUENT- ING THE WHEAT FIELDS OF THE MIDDLE WEST.

BY F. M. WEBSTER, WOOSTER, OHIO.

The swarms of small Diptera that are to be found in the fields of fall wheat in Ohio, Indiana and Illinois, during late autumn and in early spring, seldom fail to attract the attention of the entomologist who has occasion to visit these fields at the above mentioned seasons. That some species are attracted to these fields as mere visitants is indicated by the accompanying list, but that many others breed there, either upon the living or the dead portions of the wheat plants, is as clearly apparent.

It has been my custom each year to sow a small patch of wheat as early as possible, in order to attract the various inhabitants among insects, in order to study them. In August, 1897, a small plat of wheat was sown at the Experiment Station at Wooster, Ohio, and late in the fall, under my direction, a large number of these plants were transferred to a breeding cage in the insectary, and the results of this breeding were carefully watched by my former assistant, Mr. C. W. Mally. During the following April the various experiment plats of wheat were swept with an insect net and the results properly preserved.

From the wheat plants enclosed in a breeding cage, in the insectary, there emerged, during December, the following species of flies:

| | |
|-------------------------------------|------------------------------------|
| <i>Cecidomyia destructor</i> , Say. | <i>Oscinis dorsata</i> , Loew. |
| <i>Cecidomyia</i> , sp.? | <i>Oscinis coxendix</i> , Fitch. |
| <i>Diplosis</i> , sp.? | <i>Oscinis umbrosa</i> , Loew. |
| <i>Sciaria</i> , sps.? (2) | <i>Oscinis carbonaria</i> , Loew. |
| <i>Phorbia ruficeps</i> , Zett. | <i>Oscinis trigramma</i> , Loew. |
| <i>Phorbia cinerella</i> , Fallen. | <i>Ceratomyza dorsalis</i> , Loew. |
| <i>Meromyza Americana</i> , Fitch. | |

From the same lot of wheat plants there appeared during the following April:

| | |
|--------------------------|-----------------------------------|
| <i>Diplosis</i> , sp.? | <i>Oscinis carbonaria</i> , Loew. |
| <i>Chironomus</i> , sp.? | <i>Bibio pallipes</i> , Say. |

Sweeping the wheat plats during April gave us the following species, some of them being, clearly, mere visitants :

| | |
|---------------------------------------|---------------------------------------|
| <i>Sciara</i> , sps.? (2) | <i>Drosophila funebris</i> , Fabr. |
| <i>Rhamphomyia</i> , sp.? | <i>Tetanocera pictipes</i> , Loew. |
| <i>Bibio albipennis</i> , Say. | <i>Sepedon armipes</i> , Loew. |
| <i>Chironomus</i> , sp.? | <i>Scatophaga furcata</i> , Say. |
| <i>Phora pachyneuron</i> , Loew. | <i>Scatophaga stercoraria</i> , Linn. |
| <i>Phora spinipes</i> , Coq. | <i>Hyelomyia</i> , sps.? (3) |
| <i>Phora</i> , sp.? | <i>Anthomyia</i> , sp.? |
| <i>Phorbia ruficeps</i> , Zett. | <i>Schoenomyza dorsalis</i> , Loew. |
| <i>Phorbia cinerella</i> , Fallen. | <i>Cænasia verna</i> , Fabr. |
| <i>Phorbia</i> , sps.? (3) | <i>Cynomyia cadaverina</i> , Desv. |
| <i>Borborus equinus</i> , Fallen. | <i>Myospila mediatubunda</i> , Fabr. |
| <i>Limosina crassimana</i> , Haliday. | <i>Pollenia rudis</i> , Fabr. |
| <i>Diastata nebulosa</i> , Fallen. | <i>Lonchoptera punctum</i> , Meig. |
| <i>Elachiptera longula</i> , Loew. | <i>Lonchoptera lutea</i> , Panzer. |
| <i>Oscinis coxendix</i> , Fitch. | |

The determinations of the species, included in these lists, were made for me by Mr. D. W. Coquillett, through the kindness of Dr. Howard. It has, until recently, been almost impossible to get satisfactory determinations of our smaller species of Diptera, and the foregoing lists are good illustrations of the constantly increasing value, to the workers in applied entomology, afforded by the Department of Insects at the U. S. National Museum.

The University of the State of Missouri is to send an Entomological Expedition into Southern Mexico this summer. It will be in charge of Prof. J. M. Stedman, head of the Entomological Department, and will have for its object the making of a biological (largely entomological) survey of the region from Vera Cruz on the Gulf, which is in perpetual tropics, to the top of the volcano Popocatepetl, which is far above the perpetual snow line, and down to Acapulco on the Pacific. This will give all the temperature variations from perpetual tropics to perpetual snow, and will allow of the study of life zones under conditions not to be found elsewhere in North America. The collection will become the property of the University, which is to furnish half the expenses, the other half to be borne by Prof. Stedman.

THE COCCIDÆ OF THE IVY.

BY GEO. B. KING, LAWRENCE, MASS.

In Entomological News, Vol. V., 1894, p. 210, Prof. Cockerell cited all of the *Coccids* known to infest ivy (*Hedera*). Since then other species have been found, and with his consent I have prepared the following notes for publication. Leaves of *Hedera helix* sent to Prof. Cockerell from Brazil, coll. Dr. F. Noach, May, 1898, proved to be infested by *Chrysomphalus dictyospermi*, Morgan. And Mr. A. Hempel, of St. Paul's, Brazil, sent *C. aonidum*, L. Just recently he wrote me that *C. dictyospermi*, var. *jamaicensis*, Ckll. (*minor*, Berlese), was received by him from Lord Walsingham, infesting ivy at Cannes, France. *Aspidiotus rapax* (*camelliæ*) was found by E. E. Green on ivy in Ceylon (Coccidæ of Ceylon, p. 44). *Dactylopius citri*, Risso., was found at Kew Gardens, England, on a variety of ivy called *Hedera amurensis* (Newstead, Ent. Mo., May, 1897, p. 73). The following have been found by me at Lawrence, Mass.: *Aspidiotus Crawii*, Ckll., on ivy in a greenhouse, and must have been there for some time, as the vine is an old one, supposed to be about 20 years old. *Lecanium hesperidum*, L., is frequently found on ivy in greenhouses, but not in sufficient numbers to cause much alarm. *Dactylopius citri*, Risso., and *Aspidiotus hederae*, Vall., seem to be the most troublesome, sometimes covering the entire leaves of the vine, and as the leaves are used very extensively in making up wreaths and other floral designs, their presence in greenhouses causes very much damage. A list of the species now known to be found on ivy is appended below:

1. *Phenacoccus hederae*, Sign., Hab. France.
2. *Lecanium maculatum*, Sign., Hab. France.
3. *Lecanium hesperidum*, L., Hab. France and N. America.
4. *Asterolecanium hederae*, Licht., Hab. France and Italy.
5. *Dactylopius citri*, Risso., Hab. England and N. America.
6. *Aspidiotus rapax* (*camelliæ*), Hab. Ceylon.
7. *Aspidiotus hederae*, Vallot, Hab. Algeria and N. America.
8. *Aspidiotus Crawii*, Ckll., Hab. N. America.
9. *Chrysomphalus aonidum*, L., Brazil.
10. *Chrysomphalus dictyospermi*, Morg., Brazil.
11. *Chrysomphalus dictyospermi*, var. *jamaicensis*, Ckll., France.

All of the above species, except the first two, have been cited by many authors under various names. The following are some of them:

Lecanium hesperidum, L.—*L. lauri*, Boisd., perhaps is the same.

Asterolecanium hederæ, Licht., was described as *Planchonia hederæ*, and again re-described as *Planchonia Valloti*, Licht., and probably *Asterolecanium massalongianum*, Targ., is the same.

Dactylopius citri, Risso., has the following synonyms: *destructor*, Comst.; *farinosus*, Deg.; *phyllococcus*, Ashm.; *brevispinus*, Targ.

Aspidiotus rapax, Comst. Synonyms: *camelliæ*, Sign.; *citri*, Comst.; *evonymi*, Targ.; *lucumæ*, Ckll. and Town.

Aspidiotus hederæ, Vall.—For a long list of supposed synonyms of this species see Prof. Cockerell's first supplement to the Check List of the Coccidæ, 23 in all, after Berlese and Leonardi.

Aspidiotus Crawii, Ckll.—I retain this as being a valid species, although Mr. Marlatt finds it to be *A. cydoniæ*, Comst. He may find something else on the leaf or twig than is indicated by the label, and should not assume that the writer of the label saw it and confused it with the species indicated. Two or more species are often found upon the same leaf and twig. *Aulacaspis elegans*, Leon, found by me on *Cycar-revoluta* in a greenhouse at Lawrence, Mass., had mixed with it on the same leaf *Aspidiotus hederæ*, Vall. Neither can the proportional number be estimated, by any means, by those found on a slide mount.

Chrysomphalus aonidum, L., as *Coccus aonidum*, L.; *Chrysomphalus ficus*, Ashm., and *Aspidiotus ficus*, Ashm.

C. dictyospermi, Morg., as *Aspidiotus dictyospermi*, Morgan, and *C. dictyospermi*, var. *jamaicensis*, Ckll. (*minor*, Berlese).

DESCRIPTION OF A NEW SPECIES OF HÆMATOPINUS.

BY HERBERT OSBORN, COLUMBUS, OHIO.

Hematopinus columbianus, n. sp.

Head longer than broad, semicircular in front, wider and more depressed behind the antennæ, rostrum projecting; antennæ located in front of the middle of the head, the first joint large, deeply set in the border of the head, second joint the longest, third, fourth and fifth nearly equal, fifth slightly smaller; a strong bristle is borne on the postero-lateral angle. The pronotum is short, rather narrow, and the sternal plate is very broadly ovate, almost circular, but the sides posteriorly tapering slightly

and the posterior border obtusely rounded or subtruncate. The second and third pairs of legs are nearly equal and considerably larger than the anterior pair, and their tarsal claws are broad and blunt or obtuse at tip. The abdomen is elongate, segments one to seven with prominent chitinous processes at margin; long stiff hairs are scattered rather sparsely over the disk and along the margins. Length of ♀ 1.20 mm., ♂ .75-.80 mm.

This species approaches *montanus*, Osb., in form, but is narrower and smaller. It differs also in the form of the sternal plate.

Described from a number of specimens taken from the Columbian *Spermophile*, *Spermophilus columbianus*, at Pullman, Washington, by Prof. C. V. Piper, in July, 1896. Type material in the U. S. National Museum.

BOOK NOTICE.

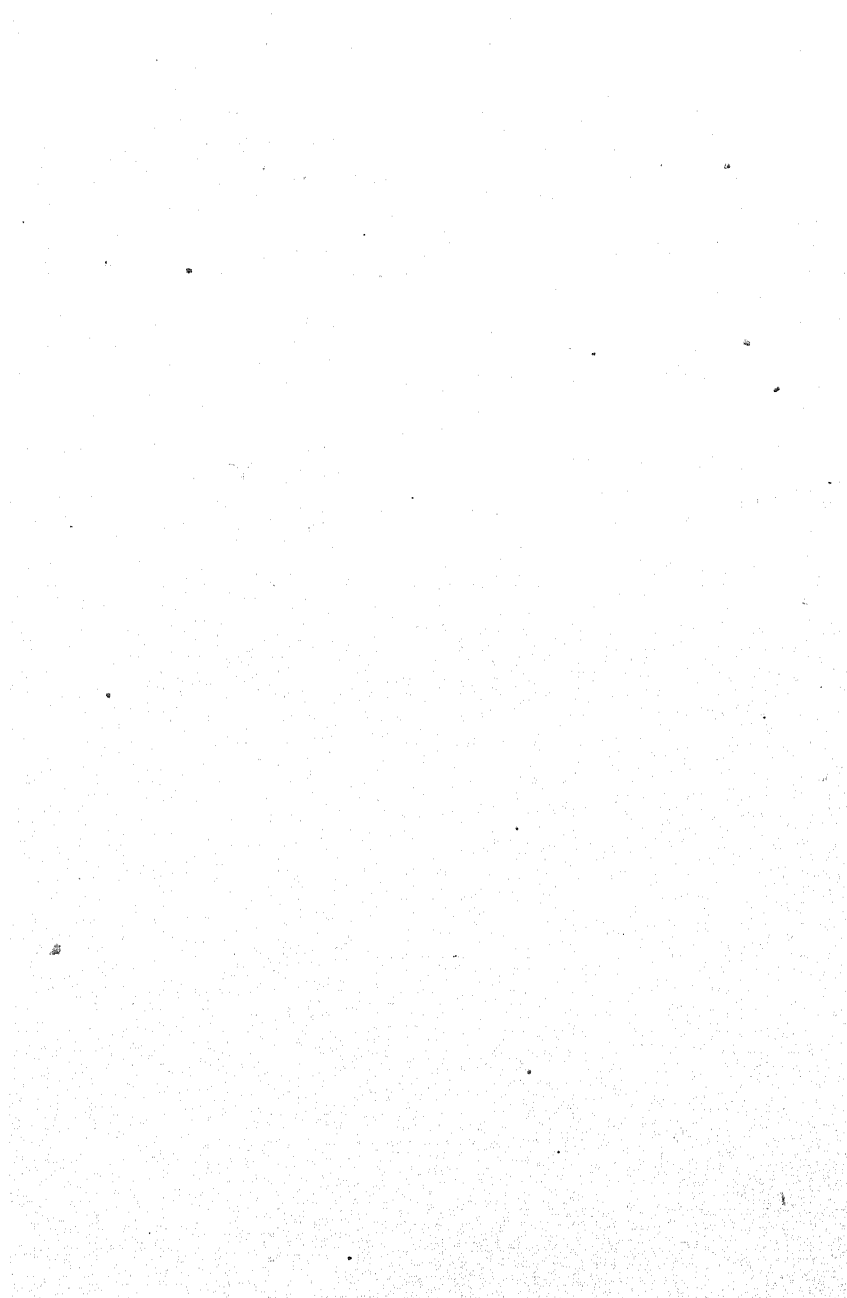
SYSTEMA LEPIDOPTERORUM HILDESIAE (Second Part).—Phylogeny and Definition of the Families of the Butterflies. With genealogical tree and plate of neuration. Mittheilungen aus dem Roemer Museum, Hildesheim, April, 1900. By A. Radcliffe Grote, A. M.

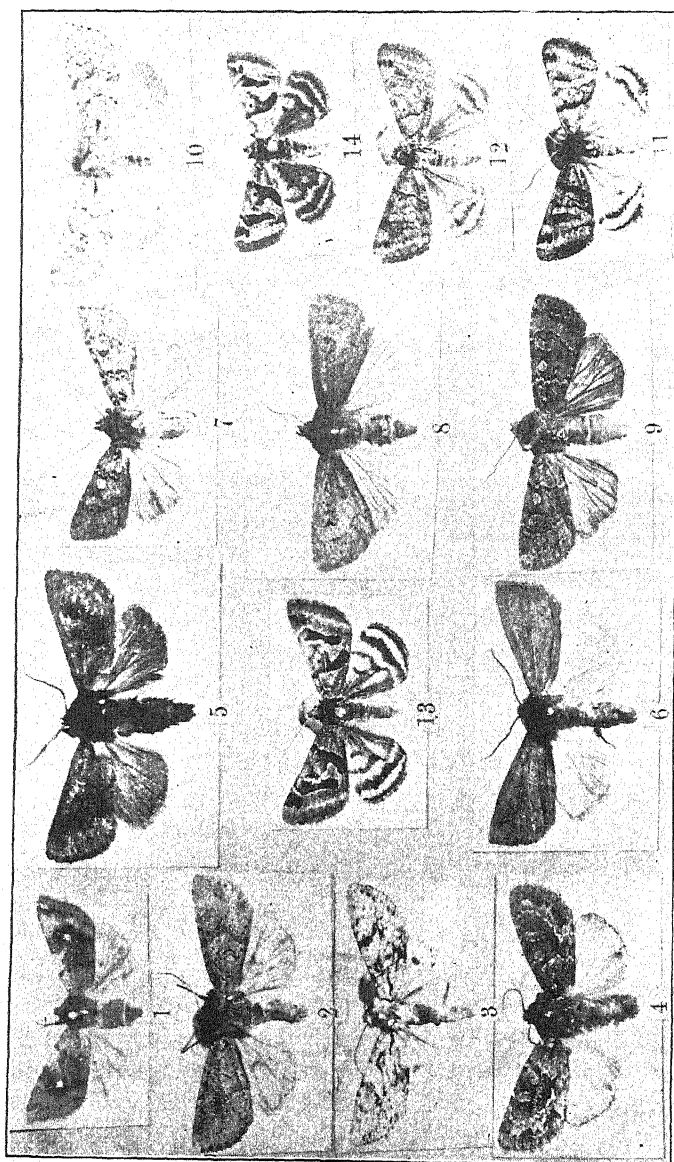
The author divides the diurnals into two series or superfamilies, Papilionides and Hesperiaes, and twelve families, giving diagnoses of the divisions. The classification is phyletic, and takes into consideration the facts of the scanty record from fossil material. As a result of these studies six larger associations of butterfly forms of general distribution are recognized, and as many smaller groups, inhabiting a restricted territory, and giving evidence in most cases of being survivals of once more extensive complexes. The nomenclature has been reviewed, and the author hopes the work may conduce to conformity in the treatment of the butterflies in literature.

DR. A. FENYES, of Pasadena, Cal., started on a collecting trip to the Atlantic Coast on the 1st of June, and will return to Pasadena in October.

DR. W. HOLLAND is to resign his position as Chancellor of the Western University in Pittsburg, the *Dispatch* of that city hears, to become Director of the Carnegie Museum.

Mailed June 30th, 1900.





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CONTENTS.

| | | | |
|---|-----|--|-----|
| Smith—New Noctuids from B. N. America | 217 | Barrett—Notes on the Cambridge Natural History, Vol. VI. | 234 |
| Erratum. | 225 | Fernald—North American species of Chorentis | 236 |
| Northwest (Canada) Entom. Society. | 225 | Johnson—New N. American Orthalidæ. | 246 |
| Bird—New Histories in Hydræcia. | 226 | Hine—Two new species of Tabanidæ. | 247 |

NEW NOCTUIDS FROM BRITISH NORTH AMERICA, WITH NOTES ON SOME OTHERS.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, NEW BRUNSWICK, N. J.

Of late years a few collectors have been sending material from various points in Western Canada, Manitoba and British Columbia. Mr. Dod at Calgary, Mr. Hanham at Winnipeg, and Mr. Heath at Cartwright, have collected many interesting species. Dr. Fletcher has sent me examples from other collectors in the same general region, so that we have now some little basis for a judgment as to the general character of the Noctuid fauna.

Within a comparatively small area, species from the Atlantic and from the Pacific Coast regions occur. The body of the species are of the Rocky Mountain series, but there is a strong admixture of forms occurring in Maine, in Northern New England, and even in Labrador. Extending westward, toward and into Vancouver, comes a decided Pacific Coast or Californian type, with an addition, the extent of which is yet uncertain, of characteristic forms. Quite a number of species which at first sight seem like well-known eastern forms, prove, on closer study of large series, to be distinct, and most of the new species that have of late reached me have been from this region or from the adjacent States of Washington and Oregon.

All the species here described are taken in British America, and, with one exception, have not thus far been taken in the United States.

In the accompanying plate are photo-engraved reproductions of the

new species and of a few others taken in the same general district, but elsewhere described.

Anytus obscurus, n. sp.

Deep, bluish gray, washed with smoky so as to obscure all the markings. So far as the latter are visible, they agree with *privatus*, save that the lines are much more even throughout. There are no contrasts anywhere, and the connecting streak between the median lines is not traceable in the specimen before me. The ordinary spots are barely defined. Secondaries a little smoky throughout, not unlike some female *privatus*. Beneath, dull, smoky. The thoracic tuftings are less obvious than in the other species, and the insect as a whole seems less robust.

Expands 36 mm. = 1.44 inches.

Habitat: Edge Calgary, VIII., 21 (Dod).

A single male, in fair condition. This is undoubtedly distinct from *privatus*, all the maculation being lost in the very deep ground, though retaining the characteristics of the eastern form so far as they are traceable. The male genitalia are obviously distinct from the others of the genus, though remaining of the same type.

Anytus profundus, n. sp.

In all essential points of ornamentation like *privatus*; but very much darker, blue-gray and black. Head and thorax blackish with a seal-brown tinge, the black line on the collar scarcely contrasting. The primaries have the median space blackish filled above the narrow black streak connecting the median lines, and the ordinary spots are thereby obscured and made indefinite. The t. p. line is distinctly more even, the points on the veins being much less prominent, and the inward tooth in the submedian interspace being much less marked. Terminal space almost uniformly dark smoky brown. Secondaries with clearer white and black contrasts than in the eastern species, and this difference holds also on the under side.

Expands 37-40 mm. = 1.48-1.60 inches.

Habitat: Brandon, Manitoba (Hanham).

It may be perhaps a question whether this is really a good species or a geographical race of *privatus*. They are nearly related, no doubt; but I am inclined to consider them distinct: not only because of the colour

and ornamental differences, evident though they are, but because the male genitalia show a slight, though constant, difference in form, and a very decided one in size, the eastern form having the harpes much larger and stouter.

Two males are at present before me, and Mr. Hanham has other specimens similar in appearance.

Mamestra negussa, n. sp.

Ground colour mouse-gray, varying a little in the amount of reddish shading. Head usually a little paler; but else no maculation. Primaries with the usual maculation all present; but nothing at all relieved or contrasting. Basal line geminate, included space a little paler, extends to the internal vein, inwardly toothed on the cell. T. a. line geminate, included space a little paler, inner portion often lost, outer brown or blackish, as a whole with a rather even outcurve, a very little toothed on the veins, tending to become distant from base so as to narrow the median space. S. t. line geminate in the costal region, else mainly defined by the slight contrast between median and s. t. spaces; when there is no such contrast the line is practically lost or marked by venular dots only. In course it is sinuate, incurved below the cell. S. t. line pale, a little irregular, in light specimens mainly defined by the darker terminal space. A series of very small, black, terminal lunules, which may be wanting. Fringes narrowly cut with pale and with a pale line at base in light specimens. Median shade obscure, outwardly oblique from costa between the ordinary spots, darkening the reniform inferiorly, then close to t. p. line, somewhat deepening the shade of the outer portion of median space. Claviform small, barely traceable or altogether wanting, a trifle paler in dark examples. Orbicular oval, oblique, of good size, varying a little in form, pale ringed and usually altogether a little paler. Reniform moderate, kidney-shaped, tending to enlarge a little inferiorly and there dark filled; narrowly pale ringed. Secondaries smoky, basally a little paler, with a dark discal lunule, a blackish terminal line and pale fringes. Beneath gray, powdery, with a smoky or blackish shade line hardly beyond the middle, and a discal spot on all wings.

Expands 37-40 mm. = 1.48-1.60 inches.

Habitat: Calgary, Canada, mouth of Fish Creek, on Sallows, May 1, 4 and 14 (Mr. F. H. Wolley Dod).

Two males and two females. Mr. Dod was good enough to send me these specimens because they seemed to him—justly enough, as it proved—different from *gussata*, which flies with it. The chief superficial difference is that the new species lacks all the black marks of the older form. There is no basal black streak, no black margined claviform and no black line to the t. p. line. The antennæ of the male are brush-like—*i. e.*, the joints are a little produced laterally and furnished with tufts of bristly hair.

Hadena cerivana, n. sp.

Head, thorax and abdomen a very pale dull gray, more or less tinged with red, especially in the female. Patagiæ with a blackish shade at base of primaries, else head and thorax immaculate. Primaries with all the normal maculation fairly well written, but not contrasting; much better marked in the female. There is a distinct, irregularly thickened black basal streak, extending about half way to the t. a. line, and this is the most contrasting bit of maculation in the wing. Basal half line geminate on costa, outer portion lost, inner brown or blackish, a little irregular. T. a. line geminate, outer portion blackish, inner tending to become lost, as a whole rather evenly outcurved, only a little drawn in on the veins. T. p. line geminate, outer portion even, smoky, tending to become lost in the outcurve over cell, inner portion blackish, tending to become lunulate, drawn in below cell, close to or actually touching inferior angle of the reniform. S. t. line irregular, concolorous, marked on costa by a darker preceding patch which fills the s. t. space, thence by a narrow, broken, brownish preceding shade, the terminal space sometimes darker in whole or in part. A series of black, distinct, terminal interspaceal lunules. Median shade line smoky, oblique between the ordinary spots, thence close to and parallel with the t. p. line, never prominent, usually obvious, rarely almost obsolete. Claviform very short, blackish or brown edged, tending to become obsolete. Orbicular large, a little paler, narrowly edged with black scales, tending to become incomplete above. Reniform rather large, kidney-shaped, tending to become a little constricted in the centre, partly black edged, incompletely pale annulate, inferiorly dusky filled. Secondaries smoky, in the female with a somewhat paler, more reddish tinge. Beneath powdery, disc of primaries a little darker, all wings with more or less obvious darker extra median lines and obvious discal spots.

Expands 34-38 mm. = 1.36-1.52 inches.

Habitat: Calgary, Canada, in June (F. H. Wolley Dod).

Four males and four females, the latter on the whole a little more reddish shaded. There is little difference between the specimens, and altogether they differ from *finitima*, with which I was at first inclined to consider them identical, by the much paler ground and much less contrasting maculation. There is a mere shade of red and the median space is hardly darker. Antennæ a little marked in the male with small tufts of short lateral bristles.

Nephelodes pectinatus, n. sp.

Ground colour luteous, with tendency to either a greenish or a decidedly red tint. Head and thorax immaculate. Primaries without defined markings, the median space deeper in colour, all beyond it more smooth, not powdery like the basal space. T. a. line single, oblique, a little outcurved, hardly darker than ground. T. p. line single, a little better defined, outcurved over cell, evenly oblique below. S. t. line marked by a narrow, broken, obscure darker preceding shade. Orbicular an undefined, somewhat paler, round blotch. Reniform a little better marked, paler, not outlined, defined only below and outwardly. Secondaries smoky or blackish, the fringes of the palest ground colour of primaries. Beneath reddish powdered, primaries with disc smoky, secondaries with a discal lunule.

Expands 38-42 mm. = 1.52-1.68 inches.

Habitat: British Columbia; Corfield, Vancouver.

Two males (the collectors not indicated on the labels). The species resembles the common eastern form, and so I have named it for more than one of my Northwestern friends, I believe; but more careful study shows a difference in the character of the male antennæ. In *minians* the pectinations are rather short and lengthened by a curved bristle at the tip. In *pectinatus* this bristle is absent, but the branches themselves are longer and a little enlarged toward the tip. The differences are thus obvious and emphasize the rather scant superficial characters. The specimen from British Columbia has a peculiar greenish tinge to the ground which I have not seen in the eastern species. That from Vancouver is washed with red-brown. It is probable, therefore, that quite a range of colour difference will be found, as in the case of the eastern form.

Cosmia punctirena, n. sp.

Ground colour rather bright luteous, with blackish or reddish powderings, so that in some cases a specimen will be almost all smoky, and in another it will seem, and actually be, red. Head and thorax without markings. Primaries powdery, the median lines darker, single, obvious in all cases and distinct in most. Basal line single, a little diffuse, not prominent. T. a. line single, oblique from the costa, forming an obtuse, more or less rounded angle in the submedian interspace. T. p. line single, forming rather an even and not very great outcurve from costa to inner margin. Median shade obvious, sometimes prominent, usually a little diffuse; extends obliquely from middle of costa to inferior margin of the reniform, forms there a rectangle and then runs parallel with the t. p. line. S. t. line of the ground colour, more or less relieved by the powderings on each side, and by a preceding shade on the costa. Terminal space usually a little dusky. A series of more or less obvious interspaceal, terminal lunules. Orbicular round or nearly so, of good size, concolorous, ringed with darker scales, sometimes barely traceable. Reniform of good size, kidney-shaped, more or less obviously outlined by a darker line, concolorous except for a dusky spot inferiorly, which is always present, even when nothing else of the spot is traceable. Secondaries yellowish, silky, sometimes with a reddish flush, with a narrow, scarcely defined, median line. Beneath yellowish, more or less powdery, all wings with an outer line and a discal spot.

Expands 37-44 mm. = 1.48-1.76 inches.

Habitat: Glenwood Springs, Colorado, September (Dr. Barnes); Yellowstone Park, Wyoming, August (Dr. Barnes); Cartwright, Manitoba (Mr. Heath).

Four males and one female, all in fair condition, and no two alike. Taken as a whole, this is a somewhat smaller form than found in the east, and not nearly so bright nor so sharply marked. Yet its markings are practically identical, save that the new form has, in all the examples before me, a blackish spot in the reniform, inferiorly, which is not present in any examples of *paleacea* (= *discolor*, Wlk., = *infumata*, Grt.) now before me. In one specimen the median space is darkened between the median and t. p. lines, making an obvious, broad band.

A male specimen from Santa Barbara Co., California (Coquillett),

may belong here ; but is much undersized, as if a little crippled, and the antennæ seem a little more bristled.

Xanthia pulchella, n. sp.

Head and thorax a rich yellowish brown, the patagiæ tending to a deeper, somewhat purplish tinge. Beneath, the body parts are brighter, more rusty brown. Primaries have a beautiful, velvety texture, the colour varying from purplish to yellow brown. Basal and s. t. spaces as a whole purplish, the latter more intense. S. t. space contrastingly yellowish brown, the median space reddish luteous, with an olivaceous shading which tends to a gray on the costa. The ordinary lines are distinct and are accompanied by rich, deep brown shades, the t. p. line forming a broad band. The inferior margin of the reniform is white, contrasting, and the whole wing is thus characteristically beautiful. Basal line whitish, margined each side with a deeper brown shading. T. a. line outwardly oblique, irregular, pale, outwardly margined by a distinct, broad, deep brown line, inwardly edged by somewhat darker scales. S. t. line pale marked on the costa, then lost in a broad band which fills the outer fourth or more of the median space, darkens the upper portion of the reniform, forms the usual outcurve over the cell, and is a little incurved below. S. t. line marked by the contrast between terminal and sub-terminal spaces, and preceded by a rich deep brown shade, best marked on the costa, then gradually narrowing and, in one specimen, lost before the inner margin is reached. Orbicular narrow, irregular, oblique, outlined in pale, not in any way contrasting. Reniform upright, rather narrow, the upper portion decidedly broader, filled with rusty red, the lower portion prominently outlined in white. Secondaries smoky, with a purplish or yellowish brown tinge, an outer marginal band somewhat paler, the discal spot obvious, though not prominent. Beneath rusty red, shaded with scarlet or purplish, powdery, the outer margin of primaries paler. Secondaries even or a little paler toward base, with an obvious discal lunule.

Expands 30 mm. = 1.20 inches.

Habitat: Livingston, Vancouver, IX., 14 ; British Columbia.

One male and two females ; one of the latter defective. This is one of the prettiest of our Noctuids and utterly different from our eastern form. It is much closer to some of the European species, and belongs to

the exceptional series containing *vulpecula* and *citrago*, in which the ordinary lines are defined and the maculation is not blotchy. I have seen two or three other examples, all from the same general region, one of them in the Strecker collection.

Drasteria conspicua, n. sp.

Head, thorax and body smoky black, more or less covered with gray scales and hair; under side almost whitish. Head usually whitish in front. Collar gray or yellowish at base and tip. Patagiae gray edged. Abdominal rings narrowly edged with yellowish. Primaries smoky, overlaid by bluish-white or gray scales, variable in depth, the markings smoky brown or blackish, contrasting. Basal half line marked on costa only. T. a. line outwardly oblique, inner margin nearly even, edged by paler, more yellowish scales. From the costa to the median vein the line forms a narrow band; below that point it broadens out into a blackish fascia, somewhat extended outwardly on the median vein and along the inner margin, so that the outer edge of the fascia is deeply indented. T. p. line forms a broad fascia, a little angulated on vein six, extending only to the middle of the submarginal interspace, pale edged at both margins. S. t. line of the ground colour or paler, preceded by a blackish shading, which may be partly obsolete; but is always marked on the costa, where a conspicuous, smoky patch, emphasized by two large black spots, practically fills the s. t. space. Usually the shading is also marked on the inner margin, extending a variable distance toward the costa and sometimes reaching it. There is a series of black, terminal lunules. Orbicular a small black spot in undefined paler shading. Reniform smoky, obscure, not outlined, chiefly marked by the median shade which ends there. Secondaries pale straw yellow to reddish luteous; shaded with black basally and with a black discal lunule. There is a black median band, a black s. t. band and a black terminal band which includes the white-tipped fringes. All the bands are narrow, resembling some forms of *Syneda*. Beneath whitish to straw-yellow, all wings with a black discal spot, a defined black median band, a smoky or black s. t. band which is diffuse inwardly, and a narrow black terminal band.

Expands 27-31 mm. = 1.08-1.24 inches.

Habitat: Calgary, Canada, May and June.

Seven examples, four males and three females, all in good condition, from Mr. F. H. Wolley Dod, who sent it as separate from *distincta*,

which also occurs there. The species is so well marked that it cannot be mistaken, and the range of variation is not great. The maculation of primaries is a reduced copy of *erecta*, much more distinct, but, in the banded secondaries, generic habit is abandoned and the form is unique. The antennæ of the male have the joints marked, laterally furnished with tufts of ciliæ. There is no difference in markings between the sexes.

EXPLANATION OF PLATE 5.

- 1.—*Xanthia pulchella*, n. sp. Vancouver, British Columbia.
- 2.—*Mamestra negussa*, n. sp. Calgary, Canada.
- 3.—*Xylomiges pallidior*, Smith. New Westminster, B. C.
- 4.—*Anytus profundus*, n. sp. Brandon, Manitoba.
- 5.—*Nephelodes pectinatus*, n. sp. British Columbia; Corfield, Vancouver.
- 6.—*Cosmia punctirena*, n. sp. Cartwright, Manitoba; Yellowstone Park, Wyo.; Glenwood Spgs., Colo.
- 7.—*Carneades Laggana*, Smith. Laggan, B. C.
- 8.—*Noctua inopinatus*, Smith. Brandon, Manitoba.
- 9.—*Carneades holoberba*, Smith. Calgary, Canada.
- 10.—*Hadena cerivana*, n. sp. Calgary, Can.
- 11.—*Drasteria distincta*, Neum. ♂. Calgary, Can.
- 12.—*Drasteria distincta*, Neum. ♀.
- 13.—*Drasteria conspicua*, n. sp. ♂. Calgary, Can.
- 14.—*Drasteria conspicua*, n. sp. ♀.

All the photographs were made from actual type specimens, except 11 and 12.

ERRATUM.—In Mr. Grote's article on "Types of Noctuid Genera," page 210, after line 18, insert:

Virtually, through Guenée's action in 1852, nictitans became the type of *Hydrœcia*. Therefore there can be no question of suppressing *Helotropha*. The validity of the genus *Hydrœcia* depends upon that of nictitans, as affording a distinct generic type. The "scientific configuration," as introduced and left by Guenée of *Hydrœcia*, is most unsatisfactory. In any throwing together of the species the whole genus should be called *Gortyna*, Ochs., 1816, type *G. micacea*, as held by me from the first until the last.

NORTHWEST (CANADA) ENTOMOLOGICAL SOCIETY.—It is gratifying to learn that a grant of \$25 per annum has been made to the Society by the Territorial Government "in view of the valuable services rendered to the public in directing the attention of farmers in rural communities to the economic phase of entomology." This official recognition will be a great encouragement to the members of the Society.

NEW HISTORIES IN HYDRÆCIA.

BY HENRY BIRD, RYE, N. Y.

The summer of 1899 was a remarkable one at Rye in the abundance of *Hydræcia* larvæ, as four species, never before noted in their larval state, and which do not seem to have their early histories described, were observed. Old acquaintances were to be found on every side, and some hitherto very uncommon ones were so abundant that a word in the matter of cause and effect may not be amiss. The seasonal conditions are, of course, contributive to such good results; still, the numbers in evidence every year suggest our looking a little further. Briefly, the environments are most propitious for the development of these borers, as that most important question, food supply, can be relied upon being adequate to all demands. The proximity to salt water insures a copious dew-fall, so that vegetation in the months of July and August does not suffer from the usual drought of this season in any such manner as it does farther inland. Here in late midsummer the larger *Compositæ* and other thick-stemmed plants are in full splendour, while fifty miles back from the coast all may be parched and leafless. So with a vigorous plant-growth assured, our friends are able to exercise their fondness in clinging to familiar haunts, and year after year we can be sure of finding a colony in the same particular location. While noted for their preference to certain places, there are a number of causes more or less evident which frequently make them leave the plant of their first selection, and it is under such circumstances that another stem close at hand is so important to their welfare. Water draining into their galleries may have something to do with this move; still, that cannot apply in all cases, and this trick of seeking pastures new is very general to all species. With the ordinary leaf-feeding caterpillar this might be accredited to mere instinctive vagaries of one sort or another, but for a larva to forsake a commodious burrow that has taken the greater part of its existence to make, and which still seems to offer all the requisites for its well-being, is harder to explain. However, the fact remains, and no doubt plays an important part in the mortality of a brood, so an abundance of food plant close at hand is a great factor in the ultimate results, as without it a certain percentage would surely starve. Evidences of the effect of this prodigality not only arise from the numerous forsaken galleries we encounter, but the number of dwarfed and evidently starved-out adults found when they make their flight is very

perceptible. Much attention has always been given to the fatalities affecting this group, on account of the long series of specimens desired, so that any causes frustrating this end have been regarded with apprehension, and have been investigated as far as possible. (See CAN. ENT., Vol. XXX., 126.)

In studying larval conditions, the close relationship existing between the species makes attention to minor details of structure necessary. Applying a general description to these larvæ, we would note their bodies being very cylindrical and provided with sixteen legs. The head is moderate in size, well rounded, slightly bulging, with clypeus evident; is usually a shining brown, and marked laterally with a black, somewhat oblique, line or dash. Mouth-parts are strong and compact. The thoracic shield is a conspicuous feature, often as wide as the head, and, in being a hard corneous plate, offers the protection needed here in a boring insect. The anal plate is also large, and defends this extremity. The various setæ arising from the tubercles and borders of the plates are exceedingly weak, and scarcely discernible except by using a lens. From being so minute, and not quite assured of their constancy, particular reference to them does not seem important.

In the matter of coloration, all agree in their earlier stages in having whitish dorsal, subdorsal and partial substigmatal lines contrastingly drawn on a dark brown or purplish body colour. These lines become less distinct at each subsequent moulting, and are lost, or nearly so, at maturity, when the colour becomes an undecided translucence of a slightly varying hue, which is affected somewhat by the kind of food plant eaten. With most species there is an abrupt termination to the lines, excepting usually the dorsal, on the first four abdominal segments, and sometimes on the last thoracic segment also. This gives an appearance at once noticeable, but only occurs up to the next to final change, when any contrasting colour effects are generally lost. For illustration see CAN. ENT., Vol. XXIX., pl. 6, where *purpurifascia* is shown in next to last stage.

For comparison of tubercle arrangement, these creatures form ideal subjects. These latter are large, corneous, often shining black, and always strongly defined. On thoracic joints two and three, I. a, I. b and II. a are small; II. b, III. and IV. are very large, the most conspicuous of any of the lateral ones, and are situated in the form of an equilateral

triangle. On the abdominal segments, tubercles I. and II. are placed in the usual oblique setting, with III., III. a, IV. and V. clustered about the spiracle. The eighth abdominal segment has I. and II. very large parallel to the dorsal line, and with their opposites form the corners to a conspicuous square. Preceding the anal plate on last segment is a lesser plate or tubercle that occasionally becomes merged into the borders of the former.

On the seventh abdominal segment, IV. is sometimes raised to a little above the line of the spiracles instead of lower down as is common to Noctuids generally.

Dr. Dyar has pointed out this feature as occurring in *purpurifascia*, and in theorizing on the unusual break, concludes it has been an acquisition—or, rather, a transposition—to more fully protect the spiracle. (Jour. N. Y. Soc., VII. 70.) A curious and perhaps significant fact is that this break occurs in the root-feeders alone, at least so far as observations have been made. Such larvæ, burrowing down to the extremities of roots, are at all times cramped for room, and are rarely able to turn round in their galleries when desiring to go in a reverse direction.

Can it be that this habit, which necessitates the constant backing of the larva to the ground orifice for the disposal of frass, and which practically means as much backward as, forward movement, is accountable for this? With the stem borers there is generally an extended burrow of ample diameter; if they wish to go in a reverse direction there is room for turning, and we may assume a forward motion predominates. Certainly the excess of backward movement made by the former would bring an undue amount of friction behind the spiracle on joint seven, and tubercle IV. has been raised to the point of greatest efficiency, the same as it is on the other segments. This is merely a random idea, of thin air consistency perhaps, and is advanced only that attention may be directed here more fully.

In dealing further with larval characteristics, it may be noted that there is a tendency on thoracic segments two and three for the skin to assume a puckered or roughened aspect, most notable in immature stages, especially when the head is retracted. Inflated examples show this invariably when but little air-pressure has been exerted in drying.

The extensile, glandular process that exudes from the under side of joint one does not seem to have been mentioned previously. It consists

of a cylindrical sack, slightly bulbous at the extremity, and in length equals or exceeds the thoracic feet. Just what function it may fulfil is at present uncertain.

For brevity in treating the following species, the application of these points on larval structure is implied; the variations from the usual form will alone be noted.

I have lately had the pleasure of examining the allied European *micacea* and *Ochria flavago* in various stages of their larval existence. The former is a counterpart of our *immanis*, and shows some typical departures from the larvæ here considered. *Flavago* is very near in general appearance to *cataphracta*, and the larval similarity is closer still. That the clypeal structure of the moth should differ so much seems odd, and may be due to the borer not displaying sufficient instinct to make an exit aperture, so that the moth must necessarily develop a clypeal spur to pierce its way out through the epidermis of the food-plant in some such manner as do the similarly armed *Nonagria*. It will be a matter of some interest when our *Gortyna (Ochria) Buffaloensis* is again located, and its history worked out so that comparisons may be made here.

If *Hydræcia* are so given to acquiring peculiarities due to special wants or differing environments, it becomes evident the more light we can throw on their full histories the better we shall be able to ultimately associate them.

The following early histories do not appear to be published:

Hydræcia marginidens, Gn.

Late in June this species was found boring in *Cicuta maculata*, the first specimen noted being high up in the plant, three feet or more above ground. Its discovery happened through a little of that detective work one learns in this branch, and which adds such a charm to the labour that might otherwise seem rather arduous. For it is with clues and not the culprits we have first to deal, and as these creatures are concealed at all times, it is no easy matter locating them. A suspiciously broken twig or withering stem, a knotty swelling, or a ventilating aperture, is usually the evidence we have to work upon; hence the satisfaction when a well-directed search, prompted by some slight symptom, discloses an *Hydræcia*. Attention was drawn to the *Cicuta* through a few inches of the top having fallen down to one side, hanging black and withered. The larva had worked upward so far that the diameter of the stem was wholly

disproportionate to its appetite, and the thin walls had finally collapsed. At all times a voracious feeder, it at last finishes its career at the base of the plant, often boring down and out through the tuberous roots. These latter are said to be the most poisonous productions of our local flora, yet *marginidens* flourish upon them to a surprising degree, becoming at maturity fat, uncanny "grubs," we might almost say, from which it would be little expected that such beautiful moths should ultimately result. Then, too, there is the unfortunate, unnecessary habit of leaving the burrow and pupating in the ground. There is a tinge of regret connected with this statement, as it recalls the slip given me by the scores of larvæ that had been located after a great amount of patient searching. The harvest of pupæ, upon which it was anticipated a finger could be placed at the proper time, was not to be mine; in its stead, experience of the usual expensive nature.

A note of August 4 reads: "After examining dozens of plants that had contained larvæ, but which had now left for pupation, one chrysalid, evidently stung, is found in a burrow, an irregular opening for the moth to get out having been made. Nearly all seem to have eaten down through the roots, going out at the lower end and apparently burrowing downward still, as though impelled by a desire of making some celestial acquaintances. No pupæ being found in the vicinity of the roots or elsewhere, we shall have to reserve our revenge for the brood of next year."

On June 30, larvæ were in the second stage from the last. The colour is a light brown, with a decided pinkish tinge. The first four abdominal segments are much the darkest by reason of the subdorsal and substigmatal lines being here discontinued. The dorsal line is very evident on all segments; these lines yellowish white; tubercle arrangement already very conspicuous and normal; on all abdominal joints I. exceeds II. rather more than it does later. Lateral tubercles darker and more contrasting than the dorsal. Head, shield and plate pale, testaceous; the shield as wide as head, and edged with black at the side. Length 1.2 inches. Next to last stage: A marked gain in length is noted, the colour has faded, head and shield are more shining and conspicuous. Length 1.5 inches; duration of stage ten to twelve days.

Last stage: All colour contrasts lost, and appearance anything but prepossessing. The soiled translucent colouring, which darkens perceptibly on first four abdominal segments, seems due to the internal fluids.

Head is shining russet, showing the black oblique side line; width .12 inch. Thoracic shield rather exceeds the head in width, very noticeable. Anal plate is not large for this group. Tubercles moderate, and being dark or blackish, are easily definable. On seventh abdominal joint IV. is low down as is customary with larvæ not strictly root-feeders. Full-fed examples attain a length of 2 inches. Duration of stage, thirteen days, with the one specimen noted. Although *Cicuta* is unquestionably the preferred food plant in this locality, note has been made of an odd specimen found in *Rumex*, and it has been found boring *Cosmos* in Maryland.

The pupa is robust for the group; colour a dark shining chestnut. Viewed dorsally, a slight constriction is seen at the base of the wing-covers. Between the segments the shell is minutely pitted. The usual delineations of head, legs, etc., are ordinary. Length one inch; duration of period about twenty days.

Hydræcia cerussata, Grt.

For a number of years past the knowledge of early history and food plant of this species had been a coveted bit of information. Like the good things that are said to come to those who patiently wait, this finally came our way, and quite extended observations were made of the last two larval stages as well as the subsequent transformations.

The species had been taken at light years ago, but seemed only periodic in appearance and altogether to be classed as a rarity. Last season was certainly not an "off year" with them, as there were a great abundance of larvæ, but they unfortunately left their burrows for pupation. This habit, shared with the preceding and some others, is a serious drawback to the collector and may merit investigation.

Can we call this a departure from the usual habit of the group—that of changing in their burrows, or is it only the retention of the more normal hereditary condition—that of a transformation in the ground? The roaming period so noticeable in full-fed larvæ immediately before the pupal change begins, must with *Hydræcia* be limited, for the season is drawing to a close and quick transformations are imperative. We may assume they become early influenced by the lethargy of the approaching change, and if this comes on so quickly that they succumb to its influence before the roaming tendency predominates, it is only natural that the galleries, as being the first place at hand, should serve as sufficiently safe

quarters for the change. In this case an exit aperture for the moth must be made and the provisional instinct here called forth is certainly a departure from the usual preparatory action taken by larvæ. The ample orifice through the plant-stock and the lid at the epidermis to screen against intruders are good examples indeed of insect forethought. That *cerussata* and *marginidens* do not undergo their changes in conditions which bring out such a display of instinct would hardly place them on a lower plane, and we may look for a cause from some other source, being anxious to find an excuse for these beauties.

Having a habitat that extends further southward than the other local species gives them a longer season, so that on becoming full-fed there may seem less haste for the change to a chrysalis, and they might indulge in a little roaming. After once leaving their burrows, we cannot expect them to find their way back again, so refuge is sought in mother earth.

Upon encountering the larva of *cerussata*, it is easy to see at once that we have to deal with a species differing greatly from the conventional form. The head is larger, the plates stronger and the tubercles seem more clustered, together with a parchment-like cuticle, giving the insect quite an armoured appearance. And it is needed! The food-plant is *Vernonia noveboracensis*, and if anyone doubts the aptness of the common name "ironweed" as applied to this plant, it would be well for them to investigate the roots, for it is here the borer works. It would be well to take some heavier tool than a penknife or garden trowel when undertaking the task.

Larvæ in next to the last stage were found July 15. The plants had been entered a few inches up from the base and a gallery started downward into the roots. Progress was slow on account of the extreme toughness of the stem. A very noticeable swelling is produced, but instead of increasing in diameter as the plant continues to grow, finally bursts open for its entire length, making an ugly scar, at once furnishing a clue for the hunter. From this time on that part of the burrow offers no shelter whatever and the workings below ground proceed slowly. Often the borer misses the centre of the stem, for be it known there is no pith to guide it, and eats its way through to the outside. Then the gallery is continued through the soil and tangle of fibrous rootlets; but this does not occur until near maturity.

Next to last stage: Very cylindrical, the skin more roughened and

drawn on the thoracic joints than with other species. The colour is a purplish brown, showing very dark on first four abdominal segments. The ordinary lines on the thoracic joints are a pure white, their continuation on the last four joints show as soiled and yellowish. Head is large, very finely granulated, of a chestnut colour; width .13 inches. The cervical shield is larger than usual in this stage, a hard shining plate of a shade lighter than the head, and has the ordinary black edging. The anal plate is at once unique, and offers perhaps the strongest point of specific distinction. Instead of being similar in texture and colour to the shield, its surface is plainly roughened or granulated; colour deep black, and its area consumes about all of the dorsal space on the last segment. What is usually a separate plate preceding the anal one on this segment, is in this case one confused area. The few setæ that arise from the borders of this plate are stouter than with other species. The tubercle arrangement is of the conventional form, the lateral ones clustered around the spiracles, and all, together with the last-named organs, are intensely black. Special mention may be made of IV. on abdominal joint seven as being raised a little above the line of the spiracles, a feature that holds with all that are strictly root-borers. On the next to last joint I. and II. are very large and with their opposites are merged into a conspicuous quadrate patch, which, preceding the unusual anal plate, gives a very protected look to this extremity. Length of insect 1.6 inches; duration of stage uncertain, perhaps fourteen days.

Final stage: The bulk and diameter now greatly increase; colours become more translucent; head and shield become heavier and darker, the former now measuring .17 inches across. Thoracic legs stout and shining black. The crochets of the abdominal feet are very strong, and although no microscopic comparisons have been made here, it is safe to say these are better developed than in the other species treated.

Tubercle arrangement remains the same, though I. and II. are perhaps less conspicuous. Large examples measure slightly over two inches in length. When full-fed they become very restless, in captivity at any rate, boring in and then out of the earth at frequent intervals, for a couple of days prior to the final rest.

The pupa is correspondingly large and robust, of a dark brown, much less shining than ordinary. The shell appears thicker, as there seems no difference in hue even when the imago is ready to burst forth. Cremaster

is blunt and hardly shows bifidate. Extreme length 1.1 inches. Moths appear Sept. 5 to 12.

It certainly means a great deal of work bringing through examples of this species, but the thrill of delight and admiration experienced when beholding the freshly-emerged insect will, we predict, be an ample compensation. Unfortunately, the beautiful plum-bloom purple of the two species so far discussed, fades more or less brownish after awhile, no matter what pains be taken to keep the specimens from any exposure to light, so that it is really necessary to breed them in order to fully appreciate these insects.

Cerussata is very fond of leaving its burrow when in the larval state, which may be explained in part by the curious splitting that the stem undergoes and which makes a kind of trough leading any dew or water directly in on the insect below. So there is cause, perhaps, for a change; but in case of isolated plants it means a serious fast and probably the substitution of some other plant as food. Such an instance had surely occurred with my first example from pupa secured some years ago, when an exceedingly dwarfed specimen emerged from a random lot of pupæ gathered in *Rumex* and all supposed to be common *cataphracta*.

[TO BE CONTINUED]

SOME NOTES ON "THE CAMBRIDGE NATURAL HISTORY, VOL. VI."

BY O. W. BARRETT, MUSEO C. G. E., TACUBAYA, MEXICO.

On page 365, Dr. Sharp states that the Hesperid larva "frequently forms a rudimentary cocoon." It does not appear to be generally known that *Doberes Mexicanus*, Feld., a Hesperid (near *Eantis*) common to Central Mexico, makes a decidedly complicated cocoon. Constructed of tough gray silk, and very closely woven, the cocoon is formed between two leaves (or, rarely, two sides of one folded leaf) of the "zapote blanco" (*Casimiroa* sp.), and suspended from a twig by a strong silk thread 70 mm. to 90 mm. in length. The mouth is closed by an exceptionally well made *chevaux-de-frise* and turned at nearly right angles to the axis of the cocoon, which is 33 mm. in length, and at the middle, 13 mm. in breadth by 9 mm. in thickness.

The larva, after entering the cocoon, as well as the pupa during its

entire existence, has the habit of frequently turning and shaking itself so as to produce a rattling noise, which has given it the popular name of "campanita" (little bell); on opening one side of the cocoon the large head of the larva or the front portion of the pupa may be seen in rapid vibration striking the walls of its chamber.

In several dozens of these cocoons I can observe no variation in the plan. No parasites noticed. Am ready to furnish specimens to those who desire a real "butterfly cocoon."

On page 397 it is remarked that "we believe they (Hepialidæ) never fly to light." I have taken *Phassus triangularis*, H. Edw.; *P. argentiferus* Walk., and a species of *Hepialus* at light, though rarely. As the body of *Phassus* is commonly 65 mm. in length, and the wings proportionately narrow and clumsy, I would suggest that the large Hepialids may venture on only short flights.

The eggs of *Phassus triangularis* are minute (0.3-0.5 mm.), very numerous, and of a gray or blue colour at first, turning to brown or black; and since they appear to be devoid of any glutinous coating, it is probable that the female merely drops them among the underbrush, trusting in the safety of numbers.

Under the new family Eupterotidæ (p. 376), the author touches on the irritating properties of the larval hairs, and on the habit of nest-building. The hairs of *Metanastria psidii*, Sallé, are barbed at the tip and very irritating, in the same way as those of *Halisidota propinqua*, H. Edw., but contain no poison. The nests of this Eupterotid on *Quercus jalapensis* are conspicuous objects in some districts, being frequently 3 to 5 feet in length. No true cocoon is made, the larva pupating in a suitable space in the home nest. The larva is nocturnal in habits, and yet it is parasitised by an Ichneumon.

Under the Saturniidæ (p. 372), Dr. Sharp mentions the ocellate marks on the secondaries of species of the genus *Automeris*. It appears that these markings have a protective value, as all the species with which I am acquainted have the habit, when disturbed, of raising the primaries (so as to expose the large glaring "eyes"), and holding the secondaries at "present arms" until the fright is over.

The cocoon of at least several species of *Automeris* has a quasi-hinged grating in its front portion, which opens only outwardly; the front is closed, but with very weak (brittle) silk.

The author also speaks of the beautiful colours and the spine-bearing tubercles of the Saturnian larvæ. The larva of *Copaxa multifenestrata*, H. Sch., is the most strikingly beautiful I have seen. In *Automeris janus*, Cr., the spine defense system is carried to an extreme; the length of the profusely branching spines is 15 mm. to 25 mm., or twice the diameter of the body, and so abundant that the larva looks like a bunch of moss a few yards away; while the quantity of poison contained in these spines is so great that during the process of inflating, the fumes which are driven off with the vapour are positively dangerous to the operator.

ON THE NORTH AMERICAN SPECIES OF CHOREUTIS AND ITS ALLIES.

BY PROF. C. H. FERNALD, AMHERST, MASS.

About fifteen years ago I obtained from Dr. O. Staudinger a series of all the species placed under the Choreutidæ in his Catalogue of the Lepidoptera of the European Fauna (1871), and made a critical study of their structure to aid in the arrangement of our North American species. This study also led me to look up the nomenclature of these insects, and the results are given in this paper.

There has been a growing tendency for some time to use the generic names proposed by Hübner, and while at first I was not inclined to adopt the genera in his Tentamen, I now feel compelled to do so. It is not necessary to argue this question, since both sides were so ably presented years ago in this journal.

Hübner, in his Tentamen published in 1806, proposed the name *Hemerophila* with *pariana* the only species under it, and we must therefore consider it the type. The genus *Simæthis* was established by Leach in the article "Entomology," published in Brewster's Edinburgh Encyclopedia in 1815, with *dentana*, Hüb., for the type. This Encyclopedia was re-published in Philadelphia in 1816. I have not seen the Edinburgh edition, but understand that the American edition now before me is a reprint, at least so far as the article "Entomology" is concerned. *Dentana*, Hüb., which is a synonym of *oxyacanthella*, L., is congeneric with *pariana*, Cl. Ic., and therefore *Simæthis* must fall as a synonym of *Hemerophila*. Hübner published the genus *Guaris* in his Verzeichniss, p. 374, with *albertiana*, Cram., *swederiana*, Stoll., and *kleemanniana*, Cram., under it. As *albertiana* seems to have been the only one of these

species known to Hübner, I am of the opinion that it should be regarded as the type of *Gauris*. Hübner has given an excellent figure of this species under the name of *Hemerophila perlata Albertiana* in his Sammlung exotoscher Schmetterlinge, Vol. I., pl. 213 (1823). Zeller, who studied several examples of this species with his usual care, placed it in the genus *Simathis*. We may therefore regard *Gauris* as a synonym of *Hemerophila*.

Hübner established the genus *Choreutis* in his Verzeichniss, p. 373, with five species under it, all of which, except *diana* and *scintilulana*, Hüb. (a synonym of *myllerana*, Fab.), are congeneric with *pariana*, and have been placed with it under *Simathis*, which may now be replaced by *Hemerophila*. The last species, *myllerana*, has been taken as the type of *Simathis*, while *diana* has been placed with *oxyacanthella*, L., and its allies, but its structural characters differ so much from the others that I feel justified in following Guenee, who separated it and established the genus *Orchemia* for its reception.

Immediately following *Choreutis*, on the same page of the Verzeichniss, Hübner established the genus *Porpe*, with only one species under it, *fibrana* (a misprint for *vibrana*, Hüb.), and as this species is congeneric with *myllerana*, *Porpe* must fall as a synonym of *Choreutis*.

It was shown by Dr. Scudder in his "Historical Sketch of the Generic Names Proposed for Butterflies," p. 96 (1875), that although the title page of Hübner's Verzeichniss bears the date of 1816, there was internal evidence sufficient to prove that it was not all published at that time. I have only concerned myself with the time of publication of the part containing the Microlepidoptera. There is a reference on page 312 to the Third Century of the Zutrage, the introduction to which is dated Aug. 27, 1825, but this page is in a signature which begins on page 305. The Third Century of the Zutrage, on page 34, makes reference to page 294 of the Verzeichniss, but this page is in a signature which ends with page 304. I therefore conclude that the first 304 pages of the Verzeichniss were published before Aug. 27, 1825, and the pages following, between this date and the time of Hübner's death, which occurred Sept. 13, 1826. It is barely possible that this part of the Verzeichniss may have been published late in 1825, but as Hübner himself made no reference to it in August, it seems more probable that it could not have been prepared and published before Jan., 1826, and therefore I have adopted

1826 as the date of publication of that part of the Verzeichniss occurring after page 304, the part including the Microlepidoptera.

SYNOPSIS OF THE GENERA.

1. { Veins 7 and 8 of fore wings forked..... *Orchemia*.
 { Veins 7 and 8 of fore wings not forked..... 2.
2. { Third segment of palpi short and blunt..... *Hemerophila*.
 { Third segment of palpi long and pointed..... 3.
3. { Second segment of palpi with long bristles beneath..... *Choreutis*.
 { Second segment of palpi without long bristles beneath..... 4.
4. { Antennæ thickened with scales along the middle
 above..... *Walsinghamia*.
 { Antennæ not thickened with scales..... 5.
5. { Palpi slightly curved up..... *Brenthia*.
 { Palpi curved up close to the front..... *Setiostoma*.

Genus ORCHEMIA, Guen., Ind. Meth., p. 58 (1845).

Head smooth, scarcely rounded in front; labial palpi medium, slightly curving up in front, second segment a little roughened beneath, the scales at the end forming a tooth pointing obliquely down and forward; third segment enlarged with scales at the outer end similar to the second segment; proboscis short and scaled basally; ocelli present; antennæ about half the length of the costa, ciliate in the male, simple in the female; thorax smooth; hind tibiæ with long scales along the upper side and middle, and hind tibiæ thickened with scales at the middle and end.

Fore wings ovate or somewhat triangular, with twelve veins, 1 with a long fork at the base, 7 and 8 forked, the others separate. Hind wings a little wider than the fore wings, with 1 b forked at the base, 3 and 4 forked or from one point, 7 and 8 connected by an oblique vein near the basal fourth of the wing. Median vein not pectinate towards the base above.

ORCHEMIA DIANA, Hüb.

Tortrix diana, Hüb. Sam. Eur. Schm. Tort., Pl. 44, Fig. 247 (1823).

Choreutis diana, Hüb. Verz. Schm., p. 373 (1826).

Simæthis diana, H.-S. Sch. Eur., Vol. V., p. 94, Pl. 38, Figs. 257-261 (1839).

Coccyx decorana, Zett. Ins. Lap., 982 (1840).

Simæthis diana, Zell. Isis, Vol. 30, p. 208 (1846).

Amphisa luridana, Walk. Cat. Lep. Het., 28, p. 318 (1863).

Expanse of wings, 15-17 mm. Head, thorax and fore wings green, the latter with the first cross line dark brown or black, much thicker on the costa and giving off two outward angles. Second line gives off an acute angle beyond the cell and another on vein 2. Both of these lines are bordered more or less widely with white or greenish-white and more or less diffused. The median shade is represented by a dark brown angulated line from the cell to the hind border, but this is often obscured by the white shade on this part of the wing. Hind wings uniformly dark fuscous. All the fringes dark fuscous, but with a lighter streak through the middle.

I have long had this species in my collection from American localities, having received it from Halifax, N. S.; White Mts., N. H., and I also took several specimens in June, 1877, at Orono, Me., in an open pasture. Walker described it from St. Martin's Falls, under the name of *Amphisa luridana*. I have also a dark variety of this species from Prof. C. P. Gillette, taken in Colorado.

The early stages and food plant are unknown, but Hartmann states that he found it on the wing near Munich in June and July between a pine forest and a juniper. The pasture in Orono where it was taken had more or less juniper (*Juniperus communis*) scattered over it, and was by the side of woods containing pine, spruce and other evergreen trees, but as there were many other kinds of plants in the immediate vicinity, I do not think this at all conclusive or even hardly suggestive concerning the food plant of this insect.

Genus HEMEROPHILA, Hüb., Tentamen (1806).

Head smooth and rounded; labial palpi medium, slightly curving up in front, strongly roughened beneath, third segment short and blunt; proboscis present, short and scaled at the base; ocelli present; antennæ half the length of the costa or a little more, simple in the female, ciliated in the male. Thorax smooth, hind tibiæ hairy along the upper side, middle and hind tibiæ thickened with scales at the middle and end.

Fore wings ovate or somewhat triangular, with acute apex and twelve separate veins: 1 with a long fork at the base; 2 arises from the outer third of the median vein, 3 to 10 arise at nearly equal distances from each

other, 7 ends in the outer margin and 8 in the costa a little before the apex, 11 arises from near the basal fourth of the subcostal vein; cell closed and with the superior and inferior cellular veins both present, but difficult to distinguish. Hind wings ovate, with eight veins, three internal veins present, 1 b forked at the base, 2 beyond outer fourth of median, 3 and 4 stalked, base of stalk and 5 and 6 arising nearly equidistant, 8 free from the base of wing, cell closed, with two cellular veins very indistinct, median not hairy above towards the base.

The only species under this genus occurring in North America so far as known at present is *vicarialis*, which Zeller described and published in the *Verhandlungen der k.k. zoologisch-botanischen Gesellschaft*, p. 322 (1875), giving the habitat "Maine or Massachusetts." This species is unknown to me.

Genus CHOREUTIS, Hüb., Verz., p. 373 (1826).

Head smooth, with the front sloping; labial palpi with the first and second segments armed beneath with long bristles, those of the second segment collected into four tufts nearly as long as the segment itself, the third segment slim and pointed, about as long and but little larger than the tufts on the under side of the second segment; proboscis short; eyes medium, hemispherical; ocelli present; antennæ about two-thirds as long as the costa, ciliate in the male, simple in the female; thorax smooth, hind tibiæ hairy along the upper and lower sides; middle and hind tibiæ thickened with scales at the middle and end; abdomen untufted; uncus present, claspers large.

Fore wings oblong ovate, with metallic markings; twelve separate veins, 1 with a fork at the base about one-third of the length of the vein, 2 arises from the outer fourth of the median, 3 to 5 usually arise nearly equidistant from each other, though in some species 3 and 4 arise from one point or very near each other, and 5 and 6 are more remote than the others, 11 arises from the basal third of the subcostal, superior and inferior cellular veins generally visible. Hind wings ovate, with eight veins, 1 b forked at the base, 2 arises from the outer fourth of the median, 3 and 4 stalked or coalesced, 5, 6 and 7 arise nearly equidistant, 7 from the upper angle of the cell, 8 free, from the base of the wing; cell closed, with two very indistinct cellular veins, median not hairy above towards the base.

SYNOPSIS OF THE NORTH AMERICAN SPECIES.

1. { Basal third of fore wings white *leucobasis*.
 { Basal third of fore wings not white 2.
2. { Fore wings with metallic markings green *inflatella*.
 { Fore wings with metallic markings not green 3.
3. { Two yellowish stripes across the outer part of fore wing . . . *virginiella*.
 { No yellow on outer part of fore wings 4.
4. { Two clear white stripes across the fore wings *onustana*.
 { Without clear white stripes across the fore wings 5.
5. { Base of fore wings marked more or less with yellow . . . *bjerkandrella*.
 { Base of fore wings not marked with yellow *occidentella*.

C. BJERKANDRELLA (Thunb.). Dis. Ent. Ins. Suec., I, p. 24, Pl. 3, Figs. 23, 24 (1784).

silphiella, Grote, Pap., I, p. 40 (1881).

gemmalis, Hulst, Tr. Am. Ent. Soc., Vol 13, p. 148 (1886).

soroculella, Dyar, CAN. ENT., Vol. 32, p. 86 (1900).

Var. a. *pretiosana*, Dup., Hist. Nat., IV., p. 182, Pl. 65, Fig. 9.

australis, Zell., Isis (1847).

Habitat.—Ill., Mo., Tex., Cal., Ore., and Europe.

Food.—In Europe, *Inula salicina*, *Inula dysenterica*; *Helenium*; *Carduus crispus*; *Carlina acaulis*; *Veronica*. In America, *Silphium integrifolium* (Coquillett).

Miss Murtfeldt sent me the following notes on this species :

"The larva is found late in June (in Missouri), and again in October, mining and webbing the leaves of *Gnaphalium polycephalum*. When small it works chiefly between the cuticles of the leaves, but later feeds externally, spinning quantities of somewhat viscid web, among which the black powdery frass is profusely scattered.

"The mature larva is 6 mm. in length by 1.5 in diameter across middle segments, from which it tapers very slightly in both directions; form cylindrical, sub-monilliform. Colour translucent, whitish green, immaculate. Head oblique, same colour as body, but horny and polished. Collar inconspicuous. Legs concolorous with general surface. Before the first transformation it becomes gregarious, the larvæ spinning their dense white sticky cocoons, something to the number of a dozen in close proximity in the general web.

"Pupa pale golden brown, 4 mm. in length, and rather stout, with no especially marked characters.

"Imagines in seven or eight days after pupation.

"In Central Missouri the species is rather rare, and, within the limits of my observation, has only occurred three times within the last dozen years, although careful watch for it has been maintained upon its food plant. So far it has not been found upon any *Gnaphalium* or *Antennaria*, except *G. POLYCEPHALUM*. I have never taken this species at light."

C. INFLATELLA (Clem.), Proc. Ent. Soc. Ph., Vol. II., p. 5 (1863);
Tineina of N. A., p. 209 (1872).

Dr. Clemens states that he described this species from a "single specimen taken on the wing in July," presumably at Easton, Pennsylvania. The type of this species has probably been lost, as I could not find it in the collection of Dr. Clemens, now owned by the Am. Ent. Soc. I would not be greatly surprised if it should prove to be a variety of *bjerkandrella*.

C. OCCIDENTELLA, Dyar, CAN. ENT., Vol. 32, p. 86 (1900).

I have long had this species in my collection under the name of *Choreutis coloradella*, and had so named it for others, but had not published a description of it, so that Mr. Dyar's name will hold. His type is in poor condition, else he would probably have recognized that it was the same as my *C. coloradella*, specimens of which I had sent to the National Museum.

Choreutis extrinsicella, Dyar, seems to be a badly-faded specimen of the above. After a careful examination and comparison of the single type specimen with all the material before me, I should not feel justified in considering it a distinct species.

C. ONUSTANA (Walk.). Cat. Lep. Het., 30, p. 996 (1864).

Habitat.—Nova Scotia; Amherst, Mass.

C. LEUCOBASIS, n. sp.

Expanse of wings 10 to 12 mm. Head, thorax and base of fore wings pure white. Outer two-thirds of fore wings dark fuscous or reddish brown, with an oblique, white costal streak before the apex, and two others of the same colour, but much smaller, on the costa between this and the white base of the wing. Outer part of the wing more or less overlaid with white scales, so dense beyond the cell as to fuse and form a distinct whitish patch. There are numerous clusters of metallic scales

scattered over the outer part of the wing, some of which form a curved line around the apex on the border, and there are two large clusters of them resting on a black ground between the white patch and the fold. Fringes reddish brown.

Hind wings and upper side of abdomen fuscous. Under side of all the wings fuscous, with the white costal spots reproduced, and there are several whitish cross lines on the under side of the hind wings. Under side of the body white. Legs white, annulate with black.

Described from four specimens, two from London, Ontario, and two from Massachusetts. This species was figured by the late Townend Glover in his unpublished work on N. A. Lepidoptera, Pl. 83, Fig. 21.

C. VIRGINIELLA (Clem.). Proc. Ent. Soc. Ph., 3, p. 505 (1864); Tineina of N. A., p. 257 (1872).

Habitat.—Va., W. Va., Penn.

BRENTHIA, Clem. Proc. Ac. Sci., I., p. 172 (1860).

Head smooth and rounded; labial palpi moderately longer, slender, smooth and pointed, slightly curving up in front, the terminal segment being shorter than the second. Proboscis very short and slightly scaled. Eyes oval and rather prominent; ocelli present, large. Antennæ simple in the female, but rather densely ciliated in the male, about half the length of the costa.

Fore wings ovate, with rounded apex and twelve separate veins: 1 with a long fork at the base, 2 from very near the angle of the cell, which is closed and extends to near the middle of the wing; cross vein convex on the outside; 10 arises from the upper angle of the cell and 11 from the subcostal before the middle. Hind wings somewhat triangular, with eight veins: 1 bifurcate at the base, 2 from near the end of the cell, which is closed and scarcely reaches to the middle of the wing; 3 and 4 from a stem which arises from the lower angle of the cell, 5, 6 and 7 nearly equidistant and parallel, 8 arises free from the base of the wing.

B. PAVONICELLA, Clem. Proc. Phil. Ac. Sci., p. 172 (1860); Tineina of N. A., p. 134 (1872).

Microethia amphi-carpeana, Cham. CAN. ENT., Vol. X., p. 76 (1878.)

Habitat.—Penn., Ill., Kan., Tex., W. I., Panama ; Brazil.

Food.—*Amphicarpea monoica* (Chambers).

WALSINGHAMIA, Riley. Proc. Ent. Soc., Wash., I., p. 157 (1888).

W. DIVA, Riley. Proc. Ent. Soc., Wash., I, p. 158.

Habitat.—Florida.

Food.—*Ficus*.

W. SLOSSONIA, n. sp.

Expanse of wings, 15 mm. Head, palpi, antennæ and thorax dark brown, with metallic reflection in certain lights. Fore wings dark brown, with a straight band across the middle, on each side of which a considerable portion of the wing is abundantly sprinkled with whitish scales, which are arranged into very fine cross lines near the band, but more irregularly toward the outer edge, which is more oblique than the outer margin of the wing. The basal and outer portion of the wing beyond the white sprinkled area, and the cross band except a black edge on each side, are changeable in colour when seen at different oblique angles, from deep violet to bright metallic red or flame colour, or golden yellow; in fact, the play of colours under a lens is quite remarkable. Fringe at the base concolorous with the adjacent part of the wing, dark fuscous on the outer part. Hind wings and abdomen above and beneath, and the under side of the fore wings, dark fuscous brown. Legs dark fuscous brown, with the first three segments of all the tarsi white at the base.

Collected at Biscayne Bay, Florida, by Mrs. Anna T. Slosson, for whom I take very great pleasure in naming this insect.

SETIOSTOMA, Zell. Verh. der k. k. Zool.-Bot., Ges., p. 324 (1875).

Head smooth and rounded; labial palpi curving up in front, closely scaled, third segment quite long, smooth and pointed. Proboscis short and scaled at the base. Ocelli present. Antennæ simple in the female, a little more than half the length of the costa.

Fore wings oblong ovate, with twelve separate veins, the cell extending three-fourths the length of the wing: 1 with a long fork at the base, 2 and 3 from before the end of the cell, 4 and 8 from the two angles of the cell, 5, 6 and 7 arise from the cross vein about equidistant from each other. Hind wings somewhat triangular, with 7 veins: 1 bifurcate at the base, 2 from the outer fourth of the cell, 3 from the lower angle, 4 wanting, 6 and

7 forked, the stem of which arises from the upper angle ; 8 free, from the base of the wing.

S. XANTHOBASIS, Zell. Verh. der k. k. Zool.-Bot., Ges., p. 325 (1875).

Habitat.—Fla., Tex., Ill.

The following notes on this species were kindly sent to me by Miss Mary E. Murtfeldt, who bred it at her home in Kirkwood, Missouri :

"The larva of *Setiostoma xanthobasis* was collected September 27th, 1890, on a variety of *Quercus stellata*. It fastened two leaves together flatly, but not with the surfaces closely applied—the web under which it was feeding, which was irregularly circular and about $\frac{3}{4}$ of an inch in diameter, being curiously 'boxed' on the margin, 1.5 inch in height where the two leaves were furthest apart. Within this fence it was feeding upon the parenchyma of the under surface of the leaf, rejecting even the smallest veins.

"At the date mentioned it seemed to be about full-grown, and may be characterized as follows: Length 15 mm., diameter 3 mm.; form sub-depressed, broadest across thoracic segments. Colour, a dull, watery, somewhat livid green, mottled with dull crimson—ventrally as well as dorsally. Abdominal segments marked on dorsum with two broad, irregularly outlined, longitudinal streaks, connected by a transverse, slightly curved crimson line. Piliferous spots and hairs inconspicuous.

"Head short, thick, pale brown, with central spot of dark brown. Cervical collar narrow, covering only one half of the first segment, horny, pale brown.

"Anal plate triangular, horny, pale brown. Thoracic legs pale brown. Prolegs similar in colour to general surface.

"On Oct. 15th, after a period of ten days' quiescence, this larva left its neat case between the leaves and spun up in an inconspicuous, tough little cocoon under the folded edge of one of the leaves.

"Imago appeared May 15th, 1891."

S. FERNALDELLA, Riley. Proc. Ent. Soc., Wash., I, p. 155 (1888).

Habitat.—Los Angeles, Cal.

Food.—*Quercus agrifolia*.

NEW NORTH AMERICAN ORTALIDÆ.

BY CHAS. W. JOHNSON, PHILADELPHIA, PA.

Pyrgota Chagnoni, n. sp.

♂.—Head reddish, vertex reticulated with brown, cheeks and occiput yellowish, antennal foveæ brown; antennæ yellow, thorax and scutellum red; numerous fine brown specks are so arranged as to form two obsolete dorsal lines and two spots on each side divided by the suture; this character is especially noticeable when looking from the head toward the scutellum, and gives the disc of the thorax a rugose appearance. Abdomen narrow, brownish, shining, posterior margins of the second, third, fourth and sides of the fifth segment more or less blackish. Halteres yellow. Legs variable in colour, with thick black hairs, especially on tibiæ, anterior and middle coxæ, basal half of all the femora and tibiæ, and all except the terminal joint of the tarsi yellow; posterior coxæ and the terminal portion of the femora reddish; outer half of all the tibiæ and the terminal joint of the tarsi blackish; the outer portion of the posterior tibiæ is intensely black, while the black of the anterior tibiæ is due largely to long thick hairs. The wings can best be described by reversing that of *P. valida*, Harris, given by Loew (Monog., Pt. III., p. 75). The whole surface of the wing has a rather uniform yellowish-gray tinge, variegated by numerous irregular, more or less confluent, maculations of a dark brown colour; at the apical portion of the wing the markings become more united, forming a noticeably darker area; the dark markings are also more prominent at the junction of the second and third longitudinal veins and along the small cross veins; in the costal and marginal cells the markings are larger and subquadrate; the costal, auxiliary and basal half of the first and second longitudinal veins, yellow, the others dark brown. Length 14 mill.

One specimen of this handsome species was collected by Mr. Gustave Chagnon, on Montreal Island, Canada.

Stenopterina bicolor, n. sp.

(*Stenopterina*, n. sp., Proc. Acad. Nat. Sci., Phila., 1895, p. 337.)

Head reddish brown, with short yellow pile; above the base of the antennæ, the bottom of the antennal foveæ and mouth-parts, blackish; orbits narrowly margined with light yellow pubescence; vertical triangle surrounding the ocelli reddish-yellow; antennæ reddish. Thorax dark metallic blue, with short yellow pile; humeri and the area extending from

the antealar protuberance around the base of the wings to the posterior angle and across the posterior portion of the mesonotum, and the scutellum, reddish; metanotum bluish, but on each side reddish. Abdomen metallic blue, with short yellowish pile. Halteres and legs reddish-yellow. Wings brownish, costal cells, the middle portion of the submarginal cell along the third longitudinal vein, basal third of the large basal cell, and the two smaller basal cells, yellowish; a small spot near the outer end and a line near the base of the discal cell, central portion of the first and all of the second and third posterior cells, the anal cell and alula brownish hyaline. Length 13 mill.

Two specimens, one of which is in the collection of the University of Kansas, were collected by the writer, at St. Augustine, Florida.

Rivellia floridana, n. sp.

(*Rivellia*, n. sp., Proc. Acad. Nat. Sci., Phila., 1895, p. 337.)

Head reddish, orbits narrowly margined with silvery-white; antennae yellow. Thorax and scutellum red. Abdomen, first and second segments reddish, the others black; halteres reddish; legs yellow. Wings hyaline, veins yellow; crossbands brown or brownish yellow, and wider than *R. variabilis* and allied species; the first and second bands are very narrowly connected at the junction of the auxiliary and first longitudinal vein, second and third coalesce at or just below the fourth longitudinal vein (in the latter case there is a very small hyaline triangle, formed by the two bands and fourth longitudinal vein), and end in a point at the posterior margin near the junction of the fifth longitudinal and transverse vein; here also the first band obscurely coalesces with the first and second; the fourth or apical band narrowly separated or more narrowly connected with the third at the tip of the second longitudinal vein. Length 5 mill.

Four specimens were collected by the writer on Dayton Island, Lake George, Florida, May 9, 1894.

DESCRIPTION OF TWO NEW SPECIES OF TABANIDÆ.

BY JAMES S. HINE, OHIO STATE UNIVERSITY.

The limits of the subgenus *Atylotus* as restricted by Osten-Sacken are not easy to determine. The presence or absence of the ocelligerous tubercle is the character which gives most trouble, for in some species it seems to be absent in the female and present in the male, and one could convince himself without a great amount of imagination that in some species it is present in one specimen and absent in another of the same sex. The type of the subgenus is *bicolor*, and associated with it are other equally peculiar species whose characters place them at once in *Atylotus*. They are small forms in which the usual banding of the eyes is lacking, as are also the frontal callosity and subcallous. The wings are glassy, transparent, resembling those of some other Tabanids when teneral.

The following species of the group appear to be undescribed :

Tabanus pruinosis, n. sp.

Length 10 mm. Colour black, opaque, the whole body having a pruinose appearance.

Female.—Front yellowish pollinose, clothed with rather short yellowish hair; frontal callosity, subcallous and ocelligerous tubercle wanting; face and cheeks yellowish pollinose and clothed with long white hairs; palpi whitish; antennæ yellowish, the first section of the third joint of medium width, gently convex below and prominent above; eyes pubescent, unicolorous; thorax dull black, clothed with long white hairs; wings hyaline, marginal cell dilute yellowish; coxæ and bases of all the femora black, tips of tarsi brown, remainder of legs yellowish; dark hairs on all the legs have a tendency to make the legs appear dusky; abdomen black, very sparingly red on the sides of the first two segments, and clothed with light hair, which usually is shorter than on the thorax.

Male.—Differs from the female in having the abdomen more broadly red on the sides—extending back on to the third segment.

Five males and three females taken in central and northern Ohio in June.

Tabanus thoracicus, n. sp.

Length 9 mm. Thorax gray pollinose, abdomen piceous, yellow on the sides.

Female.—Front yellowish pollinose, clothed with short yellow hairs; frontal callosity and subcallous absent, occiput gray, face and cheeks yellowish gray pollinose, clothed with rather short hairs, some of which appear dark, almost black from some views; antennæ yellow, first section of third joint narrow, as compared with *bicolor*, gently convex below, prominent above; thorax gray, clothed with white hairs; legs yellow; all the femora darker at base, but this colouring is most apparent in the middle pair; last joint of all the tarsi brown, tibiæ and tarsi clothed with dark hairs, wings transparent, marginal cell and some of the longitudinal veins yellow; abdomen above piceous, yellow on sides of the first four segments; below a narrow, piceous stripe is present on the first three segments, on each side of this stripe the first two segments are plain yellow, and the apical part of the abdomen is variegated with piceous and yellow.

Male.—Differs from the female in having the basal half of all the femora dark, and less yellow on the venter of the abdomen.

Two females and a male collected at Oswego, N. Y., in August; the property of the National Museum.

This species differs from *bicolor*, to which it is most closely related, in its colour, smaller size and more slender form, and in the striking difference in the form and width of the third antennal joint of the female.

The Canadian Entomologist.

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No. 9

CONTENTS.

| | | | |
|--|-----|--|-----|
| Sanderson—Larvæ of <i>Donacia</i> | 249 | Fletcher—Larva of <i>Grapta</i> J-Album..... | 273 |
| French—Parasite supposed cause of cases of Epilepsy..... | 253 | Bird—New histories in <i>Hydrocia</i> | 276 |
| Webster— <i>Harpalus caliginosus</i> a strawberry pest, etc..... | 265 | Dyar—Note on the genus <i>Dyaria</i> , Neum..... | 284 |
| Dyar—Life-history of <i>Dichogama Redtenbacheri</i> | 271 | Osborn—Two new species of <i>Jassida</i> | 285 |
| | | Correspondence—H. H. Lyman..... | 286 |
| | | C. E. Grant..... | 287 |

THE LARVÆ OF *DONACIA PISCATRIX*, LAC., AND *CRASSIPES*, FAB.*

BY E. DWIGHT SANDERSON, NEWARK, DEL.

Though the larvæ and life-histories of several species of the *Chrysomelid* genus *Donacia* have been described more or less fully by European entomologists, I have been able to find but one such note in American entomological literature. In 1877 Dr. A. S. Packard gave a brief description of the larva and life-history of *Donacia cincticornis*, Newm., var. *proxima*, Kby., in the report of the U. S. Geological Survey for that year (p. 806), together with figures of the larva and cocoon (Pl. LXX., figs. 17-19) which he found on the roots of *Nuphar advena*.

Recently I have been fortunate in being allowed to study the *Chrysomelid* larvæ in the collection of the U. S. National Museum, and among them was glad to find several species of this genus and *Hæmonia*, which with it form the tribe *Donaciinae*. Specimens of eggs, larvæ and pupæ of *Donacia piscatrix* and larvæ of *Hæmonia nigricornis* are both present from the Detroit and St. Clair Rivers, collected, I judge, by Messrs. Hubbard & Schwarz, and larvæ of *D. semicuprea*, *D. crassipes*, and *H. sosteræ* from Europe. The larvæ of *Donacia piscatrix* and *crassipes* I have found so very similar that they may be described together without mentioning the minute points of difference.

Several very distinct or typical shapes exist among *Chrysomelid* larvæ, which to a certain extent are characteristic of different tribes. Such are (1) the short, inflated larvæ of *Chrysomela* and its allies; (2) the case-bearing *Cryptocephalinæ* and *Clythrini*, with their recurved

*Read before the Entomological Society of Washington, May 3rd, 1900.

abdomens and long legs; (3) the flattened, elongate larvæ of the leaf-eating Gallerucini and Halticini, which also always possess anal prolegs; (4) the very elongate, cylindrical root and stem mining forms of the last mentioned tribes; (5) the thin larvæ of the Hispidæ, with their flat, wedge-shaped heads, rudimentary legs (though sometimes apodous) and abdomen deeply serrated laterally; and (6) the Cassidæ with their sharp, spine-like lateral tubercles and long fæcifork bearing its mass of excrement over the body.

The larvæ of the Donaciinæ have, however, a form quite distinct from any of these, though resembling most closely - as in many other respects—the Criocerini, which in turn are nearest the Chrysomelini. The body is nearly cylindrical, and forms a distinct, even arc. The head is from one-third to one-half the width of the prothorax, into which it is more or less sunken. The body gradually enlarges to the sixth and seventh abdominal segments, and then tapers abruptly caudad. *D. piscatrix* is 13 mm. long by 3.75 mm. across the sixth abdominal segment, the head being .66 mm. wide and the prothorax 1.5 mm. The segments and folds are quite sharply distinct.

The coloration is that common to most subterrestrial larvæ, the body being a yellowish-white, and the head, articulations of the legs, spiracles, and plates upon the eighth abdominal segment, dark brown.

Just behind each antenna are found four small black ocelli, and another occurs below it. The antennæ are about 0.1 mm. long, and are peculiar in that the accessory digit borne at the apex of the second segment is longer than the third. The latter bears two small digits and a stout long seta at its apex. Upon the basal segment are three small ocelli-like structures occurring commonly on most Chrysomelid larvæ. They do not seem to be the bases of broken setæ, but as to what they are or their function, I am ignorant. Possibly they are sensory pits.

The labrum is irregularly rectangular in outline, and rather large, being about .12 mm. broad. The anterior emargination common in all the nearly related genera is indicated by markings, but has become closed and almost obsolete. The setæ are unusually stout.

The mandibles of Chrysomelid larvæ are typically five-dentate, though many variations occur, and many of the Eumolpinæ are entire. In Donaciæ only the two outer teeth are developed, the three inner ones being represented by the serrated inner edge in *D. crassipes*, though apparently

entirely lost in *piscatrix*. A comparison with the mandibles of *Hæmonia* and *Crioceris* brings out this degeneration quite clearly.

The maxillæ are very highly specialized and entirely different from those of any other Chrysomelidæ. The cardo is unusually large (.15 mm.), being nearly one-half the whole length (.35 mm.), while the stipes is proportionately shorter. The palpus consists of the usual four segments, which are but obscurely defined; is rather stout, and between .15 and .2 mm. long. But the most peculiar feature of the maxilla is the relation of the lacinia and galea. In most Chrysomelid larvæ the lacinia is rudimentary or merely represented by a stout chitinous process, or spine, at the inner base of the galea, though in many of the Gallerucini and others it is as large or larger than the galea. Usually the galea is composed of a large curved sclerite, articulated to the stipes just mesad of the palpus, with its outer face on the under side of the maxilla, but so curved that at its tip it is concave on the mesal side, appearing like a hood to the small lacinia, and surmounted by numerous stiff setæ. In *Donacia* the galea seems to have faced around until its concave inner face opens directly ectad. It is surmounted by a long thin concave, transparent process, nearly the length of the last three segments of the palpus, being either a single highly specialized seta, or a number of them grown together. The inner chitinous margin of the stipes is decidedly produced at the base of the lacinia. From it project two chitinous bands nearly to the tip of the galea. At this point it is articulated to them by a socket joint, a long, stout, concave, chitinous, sword-like process, about .1 mm. long, which is encased within the sheath-like process arising from the galea. Between the chitinous bands forming the anterior margin, the base of the lacinia, and the galea, is a hollow space. At the apex of this, just below the articulation of the two processes, is a small oval mass, whether muscular or chitinous I am unable to determine, which seems to be connected to the base of the chitinous bands of the anterior margin. In the cavity of the inner chitinous process are seen two slender, whitish filaments or threads, and though they could not be traced for their entire length, they seem to arise from this oval mass, immediately below. The most plausible explanation of the use of this curious contrivance seems to be that it is used for piercing the tissues of the food plants, though this is entirely a matter of conjecture.

The labium is rudimentary, and the palpi are mere papillæ of a single segment .02 mm. or .03 mm. in length, with no trace of another segment

or palpiger, though the anterior margin of the mentum is clearly defined.

There are no true tubercles upon the thoracic or abdominal segments, the setæ thickly studding both dorsal folds of each segment laterad nearly to the spiracle, caudad of which is an area covered with setæ. On the ventral aspect are five areas of setæ, the central one being composed of two areas coalesced upon the mesal line.

Many European writers have described the larvæ of *Donacia* as having but eight segments, but as Schmidt-Schwedt has pointed out, the ninth and rudimentary tenth are easily recognizable and are very clearly seen in the last embryonic stage, as shown in the figures of Kolliker. Indeed, the latter figures show two long, filiform, lateral appendages attached to each of the ninth and tenth segments. In *Lema*, *Crioceris*, and one or two other genera, the anus is found opening in the ninth abdominal tergite, but in *Donacia* it opens at the caudal margin of the seventh tergite, and true tergites of the eighth and ninth segments are wanting, this space being but slightly chitinized and containing no true sclerites.

But the most striking feature of the *Donacia* larvæ is the pair of brown, chitinous, sickle-like appendages borne upon the eighth abdominal segment. These are about .5 to .66 mm. in length and reach nearly to the tip of the abdomen. For many years the function of these organs was somewhat of a puzzle to those European entomologists who had studied these larvæ, though in 1842 Kolliker gave a clue to their function in his paper on the embryology of *D. crassipes*, Fab., stating that on the third caudal segment are two cylindrical tubes connecting with the main tracheal trunks ("—atque ex tertio dorso tubuli duo cylindrici cum trachearum truncis communicantes enati sunt" — Kolliker, *Observationes de Prima Insectorum Genesi*, etc., Turici, 1842). Perris, in his excellent article on the larva and life-history of *D. sagittaria*, Fab. (*Ann. Soc. Ent. Fr.* 2d ser. t. VI., 1848, p. 33, Pl. II., No. 2, fig. 1-2), stated that their function is wholly unknown. Heeger thought they enabled the larvæ to cling to the roots of the plants, and aided them in creeping.

The manner in which these larvæ are enabled to breathe under water and to form a cocoon filled with air has also been somewhat of a problem. At the base of each appendage is what to all appearances is a very large spiracle. Perris thought that these are closed by a thin membrane, but that the air of the tracheal system is purified through

them by osmosis, a highly improbable conjecture, considering the small surface they allow for such diffusion. Von Seibold (Amtlichen Bericht der 34sten Versammlung der deutschen Naturforscher und Aerzte, Karlsruhe, 1859, Seite 211), in describing *D. linearis*, thinks these to be true stigmata and that the larvæ breathe the air found in the intercellular spaces of the roots, first eating into the root and then inserting the sickle-shaped appendages so that the stigmata are placed close to the openings thus made.

The most careful study of this matter has been made by Dr. E. Schmidt-Schwedt (Bul. Ent. Zeit., Bd. XXXI., Heft II., p. 325, Pl. V., figs. 1-11, 1887) upon *Donacia crassipes*, Fab. The cocoons were found in October on the roots of the white water lily (*Nymphaea alba*), and were usually found to contain beetles. How these were filled and kept replenished with air was a problem which had never been satisfactorily explained. He soon found an opening toward the end of the cocoon on the side next the root leading into a passage communicating with the air passage in the root, which explained how the cocoon might readily become filled with air coming out from the root and expelling the water. Though not entirely clear, I should judge from the figures and text that he believed this air passage to be a cavity eaten out by the larva. Later, however, he describes and figures the cavities made through the cocoon and into the root tissues by the two appendages. In the cocoons of *D. piscatrix* and *Hamonia nigricornis* it is clear that the cocoon is entire next to the root, with the exception of a pair of elliptical holes at one end, leading to two corresponding cavities in the roots and very evidently formed by these appendages. I could find no marks of feeding beneath the other ends of the cocoons, and at least the air is replenished if it is not originally taken into the cocoon through these two passages. Dr. Schmidt-Schwedt points out that usually when a plant is thus wounded a corky formation ensues, but that such is not the case in this until the beetle has emerged from the cocoon and the water is admitted, when a cork formation at once takes place and the passage is closed. It seems evident that the larva, breathing as will be further described, merely forms the cocoon close to its body, thus expelling all the air, withdraws the appendages from the two passages and transforms to the pupa, which thus admits the air from the roots and remains open, replenishing the air for the pupa and beetle.

Concerning the structure and function of these larval appendages, he

states that in cross section each is seen to be composed of five canals, two pairs above and a single larger passage below, which opens below slightly before the tip. By inserting the appendages into the roots the larvæ are enabled to draw in the air found in the large vascular bundles, through this opening in this lower channel, which supposedly connects with the tracheal system. Concerning the two upper pairs of canals he says nothing except that they are highly chitinized to secure the firmness of the appendage, but concerning the lower, remarks: "How this formation—a chitinous tube opening at the end—came to pass histologically I was not able to ascertain till the present observations. It comes near calling to mind a tubular outgrowth of the hypodermis at the stigma. In accordance with this is the fact that the wall of this questionable canal, especially near to the base of the appendage, is not simple, but is double, and no cells are to be found between." (Free translation.) In support of this view he found that small pairs of scars which when cross-sectioned exactly correspond in size to the tips of the appendages, and are at the correct distance from the scars where the larva had been feeding, could be readily found, and these I have found on stems bearing the cocoons of *D. piscatrix*. Doctor Schmidt-Schwedt states, however, that in removing the roots of the food plant from the mud the larvæ always released their hold, and that when rearing them he did not find them with the appendages inserted until he darkened the breeding cage, and then that the *points* were found inserted, but that they were disturbed by the light and withdrew them in a short time. Perris states that he cut off these appendages at the base without injuring the larva. But as Dr. Schmidt-Schwedt says, he did not state how long they would live under water with them removed. On the other hand, neither does the latter writer state that he determined whether or no the larva would not live under water if entirely removed from the root.

I have not been able to study any live larvæ to determine the function and manner of use of these interesting appendages, though I hope to do so at an early date, but have made a very careful study of their structure, only, however, by means of free-hand sections. First, however, it may be noted that true spiracles occur on the cephalo-lateral angle of the mesa-thorax and upon the first seven abdominal segments, as in other Chrysomelid larvæ. The structure of the spiracles, however, is rather different from any others I have observed. I have not made any sections of them, but a lateral view is figured, showing them to be elongate and

apparently with a good-sized cavity within. Spiracles of other Chrysomelid larvæ have merely two lips or flaps, guarded inside by a few hairs. At the base of each of the sickle-like appendages occurs the eighth abdominal spiracle, which I believe to be open. The opening can be seen very clearly in one mount, though it occurs considerably below the surface of the body, and would probably not be seen except in a prepared specimen. A trachea branching from the main trunk can easily be seen opening at each of these spiracles. Around each of these and forming the base of the appendage is a circular, chitinous structure, apparently tubular. From this arises the appendage with no visible line of demarcation.

In cross section each appendage is seen to consist of five passages. The lower side of the appendage is membranous and encloses the lower channel which extends up through the central portion, between the two main canals. This membrane is clearly an outgrowth of the outer cuticle, connecting the chitinous wall of the two lateral channels, and doubtless covering the whole appendage, though not discernible in a rough, thick section. The two lateral passages have thick, chitinous walls, marked with striations, seemingly tracheal tæindia. The two upper passages are open above, but can be readily closed by a wedge-shaped piece which runs along the top of the appendage. The lower canal has absolutely no connection with the tracheal system, as far as I can observe, and the membrane enclosing it below is continuous with that of the cuticle of the eighth segment. The lateral passages open into the tube surrounding the spiracle. At their base this is at first striated as are the passages, but the striations become irregular, forming a network, and finally a sieve-like or grate-like structure on the anterior portion. When the appendage is viewed laterally it is transparent enough to reveal a series of elliptical openings running along the upper portion, two series evidently arising from each of the lateral passages. From each of these openings arise several small tubes, sometimes branching slightly near the base, each of these structures resembling a rather coarse miniature gill. By breaking open a lateral passage from below one or two of these holes can be clearly seen. The outer series of holes and the tubules branching from each are easily seen both by a lateral view and cross section. The exact structure and position of the inner series I have not been able to determine so satisfactorily, but they seem to extend along the membrane forming the side of the wedge-shaped apex of the append-

age, the series from each lateral passage along either side, and each sending off a small branch toward the other, somewhat before reaching the lateral margin, where they terminate. Whether these tubules are open at the tips or not I have not been able to determine. If so, they doubtless act as a sieve through which the air is admitted to the lateral passages which convey it to the main tracheal trunks. But if we consider them as closed, as I am inclined, the whole structure is remarkably well adapted to aerating the tracheæ by osmosis, whether the pure air is secured from the air cells of the plants or from the water. The wedge-shaped apex of each appendage shuts down tightly on either side, thus making a solid cylinder with which to pierce the plant. That it does so pierce the tissue of the root while constructing the cocoon, and that the passage thus made replenishes the air of the cocoon, there can be no doubt. But whether the larva secures air from the intercellular spaces of the root by direct communication or osmosis, or by osmosis from the water, the appendages thus serving as tracheal gills, would seem to need demonstration, inasmuch as Dr. Schmidt-Schwedt observed only the points of these appendages inserted into the roots.

However that may be, I feel certain that the appendages are truly a highly specialized form of spiracle. I would hardly arrive at this conclusion had I not observed a very similar structure in the pupæ of the genera *Ocotoma* and *Odontota* of the tribe *Hispini*. The larvæ of these species mine within leaves, and the pupæ remain within the leaves. Projecting caudad from either fifth abdominal spiracle—which is usually the last in Chrysomelid pupæ—is found a stout, chitinous spine about the length of a body segment. In the pupa of *Ocotoma plicatula* the fourth spiracle is expanded caudally about half as much as the fifth, and the third is but slightly expanded, merely being produced to a point caudally. But the gradation is complete, and it is easily seen that the spine-like process of the fifth segment is but an outgrowth of the spiracle. Each of these spiracles, 3 to 5, has the external opening surrounded by a circular tube, also connecting with the trachea, and this circular tube is merely drawn out to a point, so to speak, to form the process of the fifth segment, the process gradually increasing in length and acuteness from the second to the fifth abdominal spiracle. This appendage forms merely a simple tube with the sides curled up and in to form an elongate cavity, in which the lining surface is membranous and finely reticulated. Further than this I was unable to observe any structure, as the projections are

hardly .12 mm. in length. The resemblance to the structure of the eighth abdominal spiracles of *Donacia* is, however, most striking, and, with the exception of the inner structure of the appendages, is complete. This difference, I think, can readily be accounted for and the evolution of a type of spiracle like that of *Donacia* larvæ be shown from a simpler form as found in these *Hispid* pupæ.

The life-history of *D. crassipes* has already been intimated. I do not know that the life-history of *D. piscatrix* has been carefully studied, but from facts obtainable I would judge it to be as follows: The eggs, which are of a brown colour, flattened oval in shape, about .75 by .25 mm., are laid in a double row, the line between the two rows being formed by the ends of the eggs, 20 to 30 of which are laid in a bunch. These are deposited early in summer on the roots of *Nymphaeas*, upon which the larvæ feed. The cocoons are found on the roots or sometimes on the stems of water plants, and the beetles emerge either in the early fall or remain in the cocoons till the next spring.

The larvæ of *Hæmonia* are much the same, the specimens I have seen being shorter, and plumper, with the abdominal appendages extending ventrad almost perpendicularly and covering the caudal segments. The best characteristic between the two genera is the loss of the ocelli in *Hæmonia*, which I judge is the more specialized genus. I have been unable to observe the prothoracic spiracle mentioned by Lacordaire.

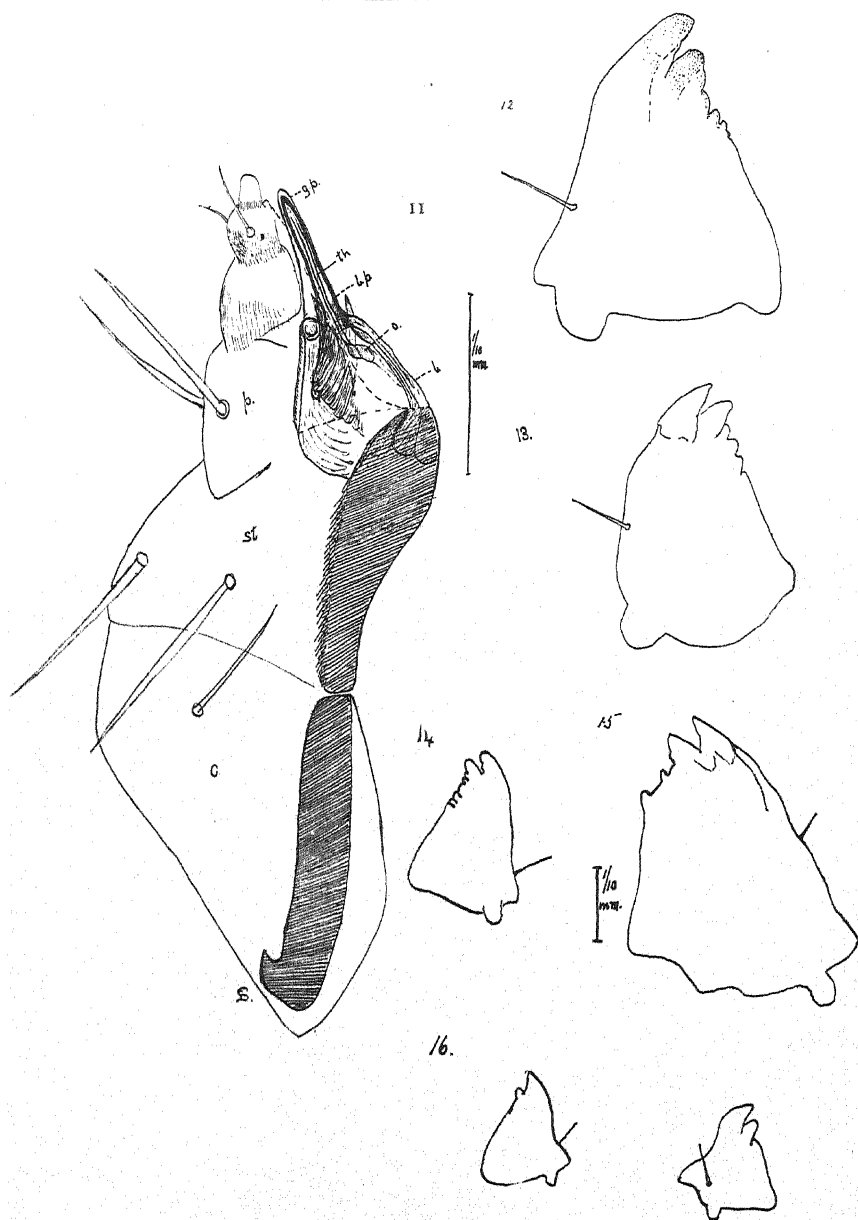
Certainly, altogether, the larvæ of this tribe are most distinct from those of all other Chrysomelidæ, possibly even more so than are the adult beetles.

EXPLANATION OF FIGURES.

Figures are from camera-lucida drawings by the author, except Figs. 17-20.

- | | | |
|----------|----------|-------------------------------|
| Fig. 1.— | Antenna, | <i>Donacia piscatrix</i> . |
| " 2.— | " | <i>Donacia crassipes</i> . |
| " 3.— | " | <i>Haemonia zosteræ</i> . |
| " 4.— | " | <i>Crioceris merdigera</i> . |
| " 5.— | " | <i>Chrysomela varians</i> . |
| " 6.— | " | <i>Haemonia nigricornis</i> . |
| " 7.— | Labrum, | <i>Donacia crassipes</i> . |
| " 8.— | " | <i>Donacia piscatrix</i> . |
| " 9.— | " | <i>Haemonia nigricornis</i> . |
| " 10.— | " | <i>Haemonia zosteræ</i> . |





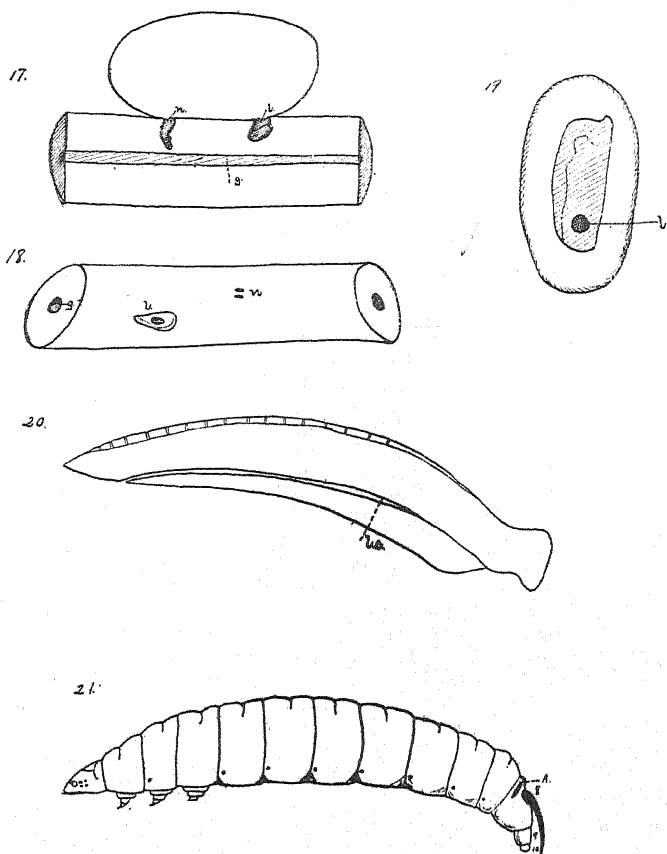


Fig. 11.—Maxilla, *Donacia piscatrix* and *crassipes*.

c., cardo; st., stipes; p., palpus; G., galea; l., lacinia;
l. p., process of lacinia; g. p., process of galea—or sheath;
th., threads in lacinial process; o., ovoid mass.

" 12.—Mandible, *Haemonia nigricornis*.

" 13.— " *Haemonia zosteræ*.

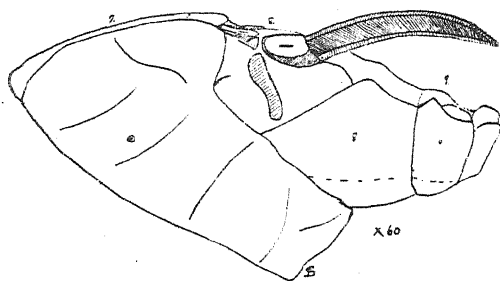
" 14.— " *Donacia crassipes*.

" 15.— " *Crioceris merdigera*.

" 16.— " *Donacia piscatrix*.

" 17–20.—(after Schmidt-Schwedt).

22.



23.

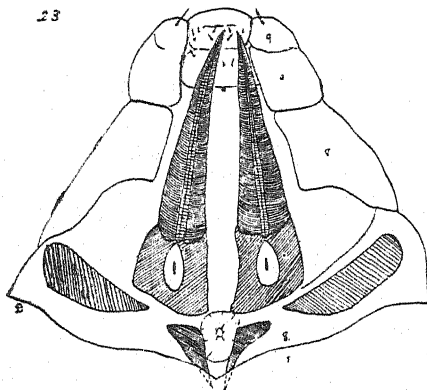


Fig. 17.—Longisection of stem and cocoon of *D. crassipes*.

n., cavity made by abdominal appendages ; l., feeding cavity.

18.—Exterior view of root, showing feeding spot (l) and scars of abdominal appendages (n).

19.—Under side of cocoon when removed from stem ; l., opening ("Oeffnung in demselben").

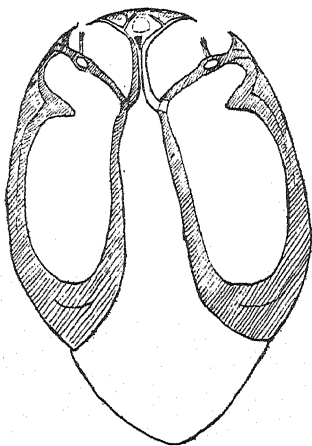
20.—Lateral aspect of an abdominal appendage ; l.c., lower canal ("der untere unpaare kanal").

21.—Sketch of larva of *Donacia crassipes*, enlarged ; a., anus.

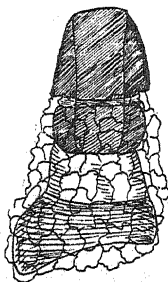
22.—Lateral aspect caudal segments of larva of *D. crassipes*.

23.—Dorsal aspect of same.

24.



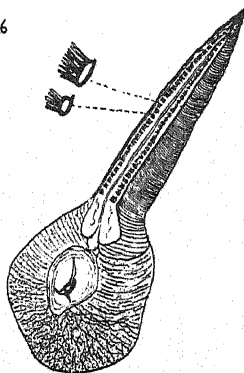
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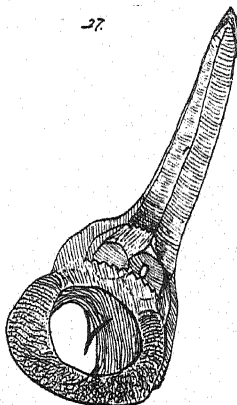
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26.



27.



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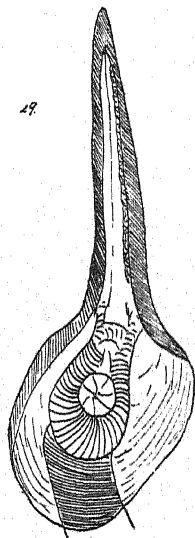


Fig. 24.—Transsection of appendage of eighth abdominal spiracle.

" 25.—Lateral view of abdominal spiracle (1-7) covered with epithelial cells.

" 26.—Dorsal aspect eighth abdominal spiracle.

" 27.—Ventral " " " "

" 28.—Third, fourth and fifth abdominal spiracles of pupa of *Octotoma plicatula*.

" 29.—Fifth abdominal spiracle of same.

A PARASITE THE SUPPOSED CAUSE OF SOME CASES OF EPILEPSY.

BY G. H. FRENCH, CARBONDALE, ILLINOIS.

Gastrophilus epilepsalis, n. sp.

Larva: Length, 1-12 inch; of the shape shown in the accompanying figure (Fig. 30), with twelve joints besides the head, or thirteen joints; head rounded, with two brown-black hooks, the side view of the cut showing only one of them; head a little longer than broad, rounded; the first incisure with a patch of bristles below the hooks, but not anywhere else; incisures 2 and 3 without bristles; incisures 4 to 12 armed with several rows of minute bristles, all very short except those on 12, pointing backward; joint 13 rounded. Extending back from the hooks and of the same colour, only in places paler, is a marking that seems to be a chitinous support for the hooks, beneath the cuticle. Colour a dirty yellowish white.

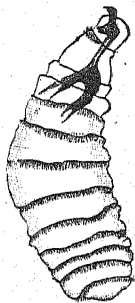


FIG. 30.

Usually it is not wise to describe a species as new from a larva, but for the following reasons it seems best in this case. Last November, at the meeting of the Southern Illinois Medical Association, in Chester, Ill., Doctor H. C. Adderly, of that town, reported to the Association a case under his charge of a boy, then 10 years old, who had been subject to epileptic spasms for four years, often having as many as twenty spasms in twenty-four hours. Upon producing a free cathartesis (the general condition of the bowels being constipated), he noticed that the excreta was "literally alive" with

an entozoan. Some of these were sent to St. Louis for identification, but were reported as unknown to them.

With the report Dr. Adderly exhibited a few of the entozoa in a small vial of formaline. These were later brought to me by Dr. A. M. Lee, President of the Association. They were new to me. From correspondence with Dr. C. W. Stiles, of the Bureau of Animal Industry, Washington, D. C., and others, I have decided that the entozoan is new and therefore propose for it the above name. Doctors Howard and Coquillett pronounce it without hesitation the larva of a species of *Gastrophilus*, though in some points it seems to me to resemble some species of the allied genus *Dermatobia*.

For several reasons this entozoan found in the enteric canal of this boy seemed to be the cause of the epilepsy. 1st. After a free cathartesis the spasms would cease for from three to six weeks, or till a new brood were grown. 2nd. The boy had with the spasms globus hystericus, which is reflex from the pelvic organs. 3rd. That the spasms were those of genuine epilepsy there was no doubt, as there were all the usual symptoms, including mental aberration. 4th. Two other cases of epilepsy are known to the writer where these parasites have been found, one in Chicago and the other in Sparta, Ill. 5th. Upon Dr. Adderly's changing his treatment from that usually followed in epilepsy to anthelmintics, the boy recovered, having had only one spasm since beginning that line of treatment. Under date of May 19th he writes me: "My little patient seems to be in excellent health, and I hope it will be permanent."

As to the adult state of this larva I can say nothing now, nor how it gains entrance to the human system. I had hoped to get more material before writing this, from which I might answer both of these questions, but as yet have not succeeded. But the continuous infestation of the enteric canal by dipterous larvæ is not new. Dr. J. Gasser, of the military hospital of Oran, Algeria, reports a case of ten years' standing. The date of this report was 1895.

An interesting exhibit prepared for the Paris Exposition is a complete set of bed hangings manufactured in Madagascar from silk procured from the halabe, an enormous spider found in certain districts of the island. Aside from being so unusual, this exhibit seems to indicate that there is a future for silk manufactured from spider's web. The matter has received the attention of M. Nogue, the head of the Antananarivo Technical School, who has already achieved wonderful results. Each spider yields from three to four hundred yards of silk, which can be taken from the animal every ten days, it being set free in the interval. The silk of these spiders is stated to be finer than that of the silkworm and of an extraordinary golden colour. It is extremely tenacious, and can be woven without the slightest difficulty.—*N. Y. Post*.

HARPALUS CALIGINOSUS AS A STRAWBERRY PEST, WITH
NOTES ON OTHER PHYTOPHAGUS CARABIDÆ.

BY F. M. WEBSTER, WOOSTER, OHIO.

In nearly all of our books relating to beneficial insects, published within the last twenty years, there is almost sure to be found, somewhere, the figure of a larva tragically devouring a smaller larva, the larger having been originally figured as that of *Harpalus caliginosus*. Although attention has for some time been called to the fact that the larva thus figured really belongs to another species, the true *H. caliginosus* being as yet unknown, yet the use of the figure in its old application still goes on. The carnivorous habits of the beetle itself, however, have been pointed out by Dr. Lintner, in his Twelfth Report, p. 209, where it is recorded as feeding on the army worm, and in Insect Life, p. 228, Vol. VII., as feeding upon grasshoppers. The writer has also observed it preying upon other insects. For this reason, notwithstanding its known fondness for seeds and grain, it has been looked upon, generally, as a beneficial species, its known vegetable food consisting either of seeds of no economic value, or the amount of grain being too small to be taken into consideration.

On June 12, 1898, I received from Mr. J. A. Fisher, Flushing, Ohio, complaints of a very serious injury to ripening strawberries, and Mr. C. W. Mally, then my assistant, was sent out to investigate the cause of the trouble. Other strawberry growers, in the neighborhood of Flushing, were found to be also suffering from the same depredation, but, though Mr. Mally worked faithfully, he was not able to solve the problem of the author of the ravages, which, in some cases, resulted in a loss of the larger portion of the crop. Considerable numbers of a Lygæid, *Myodocha serripes*, were found about the berry fields, some of them in the act of puncturing the fruit, and, I might add here, that in nearly every case where complaints of this injury have been reported to me, this last insect has been sent as the culprit. On 25th of the same month, Mr. Oliver Garlough, Clifton, Ohio, in almost the opposite corner of the State, reported the same trouble, except perhaps more emphasized, also accusing the *Myodocha* as the cause thereof.

My assistant had noticed in his investigations at Flushing, that wherever the strawberries had been attacked there would be found, on the ground or on prostrate leaves directly underneath, scattered fragments

of the hulls of the seeds of the strawberry (see plate 6), thus showing that the pest must have possessed a biting mouth and a fondness for seeds, and while this placed the *Lygæid* beyond the boundaries of consideration, nothing else was found to point to any other insect, although some observations made more than twenty years before led me to suspect some Carabid as the true author of the trouble. The fruit itself was comparatively little eaten, the surface, especially in case of that nearly or quite ripe, being badly torn and lacerated; not much gouged out, as would likely follow the attacks of a fruit-eating insect or myriapod. Despite the fact that very few Carabids had been found about the affected strawberries, I strongly suspected that, sooner or later, we should find one or more of these doing the injury.

On June 6, 1899, there came complaints of the same sort of injury from Mr. William Hoyle, Radnor, Ohio, a new locality, Mr. H. being very confident that the *Lygæid* caused the trouble, as he had found many of these on the berries. More urgent matters claimed my attention, and no investigation of this outbreak was attempted, and no other attacks were reported to me during the year.

June 6, 1900, I received a note from Mr. Fisher to the effect that the same trouble that had occurred in 1898 had again commenced, and a few days later a telegram reported continued serious effects. On June 12 I visited the locality, personally, and found fully half of the fruit being rendered worthless, the injury being done during the time between evening and late morning, say between 8 p. m. and 7.30 a. m. The injured fruit had been but little eaten, but nearly every seed was missing and the hulls scattered underneath. I have noticed this, rarely, for years, but as it never appeared to amount to more than a trivial injury, I had done no more than to wonder at the nature of the author thereof. The *Myodocha* were present, but it was clear that the work was not of their doing. Searching about a cluster of badly-injured berries, one *Harpalus caliginosus* was found underneath a clod, but, as the berries had evidently been attacked several hours before, this proved nothing. Further examinations resulted very much the same, until I found a cluster of ripe berries, the surface of which were raw and bleeding from a seemingly fresh attack, and, as usual, one of the *Harpalus caliginosus* was found hiding in a small crevice in the ground near by. After two or three such had been captured, a microscopic examination of the contents of the alimentary canal revealed the broken and crushed fragments



HARPALUS CALIGINOSUS AS A STRAWBERRY PEST. (PLATE 6.)

of the substance of the seeds in great abundance. Material collected in early morning and examined microscopically, showed the alimentary canals literally packed with this sort of food. I did not take the beetles in the act of working their destruction, as they are exceedingly shy, but some days after my return, a letter was received from Mr. J. Marion Shull, North Hampton, Ohio, enclosing with a cluster of injured strawberries a specimen of the pest, and stating that he had observed them in the very act. This was my first letter from Mr. Shull, and he could have known nothing of my investigations, and I am indebted to him for the drawings from which the accompanying illustrations were engraved.

The damage has, the present year, proved very severe, several strawberry growers reporting that half their crop had been ruined. Mr. Shull states that nine-tenths of their crop was destroyed within 48 hours, while Mr. A. H. Miller, of Osborne, stated that of his Crescents not five per cent. were picked, and of ten other varieties none were picked at all. This was the first year that Mr. Miller had been troubled by the pest, though he is perfectly familiar with the insect itself. Of the different varieties attacked, the Cumberland, Haverland and Greenville are said to suffer the worst, though this may not result from any selection of varieties by the beetles, but may be owing to better opportunities for hiding away during the day. Prof. M. V. Slingerland wrote me early in July of this year, stating that he had received complaints of similar injuries to the strawberry in New York. The beetles have been excessively abundant in the city of Wooster, literally swarming during some evenings and driving people from their front porches and verandas, forcing them to sit indoors during the early evenings, especially in the near vicinity of the electric lights. Although there are many acres of strawberries grown in the near vicinity of the city, strangely enough, I have been unable to learn of any injury from the attacks of these beetles, and have wondered if it were possible that the electric lights had attracted them from the surrounding fields to the city.

Both Dr. Bos and Miss Ormerod state that *Harpalus ruficornis* eats the fruit as well as the seeds of strawberries, but I think that further investigation of the European species will disclose the fact that, like its American relative, it is the seeds that are its favourite food, and though, as stated by Miss Ormerod, it will live in confinement on strawberries, yet when free in the fields it will prefer the seeds, as in her Twenty-first Report, p. 115, she quotes one of her correspondents as stating that the

ground in many places where the beetles had been at work was covered with a powdery dust—the seeds eaten off the berries. The seeds of the strawberry are not very easily detached from a ripe fruit without taking more or less of the substance along with it, and in the case of our *Harpalus caliginosus*, there were sometimes small pits eaten out of the berry. I attributed these to the work of other insects. Miss Ormerod calls attention to the increasing seriousness of this injury in England, in her Reports for the years 1894, 1895, 1897, and 1899; in one instance, at Bone Hill, near St. Alban's, the beetles were so numerous about 10 p.m., June 14, 1897, that members of a family sitting in front of the house supposed that the insects were dropping from the roof. From a comparison of the figure of an injured strawberry, which is used in illustration by Miss Ormerod, in her reports of the ravages of *Harpalus ruficornis*, with the figure drawn by Mr. Shull, from life, it will be seen that the work of the two species is very much alike.

As our species is very large and conspicuous, they are easily seen after one has learned where to search for them, and when their work is first observed they can be hunted out and killed, or perhaps they might be poisoned with a mixture of wheat bran, sweetened water and arsenic, placed under boards laid down between the rows of plants.

The Carabidæ, to which family of insects *Harpalus caliginosus* belongs, are generally considered beneficial, as they are supposed to feed, largely at least, upon other insects injurious to the fruit and grains of the husbandman. The number of exceptions to this rule, however, appears to increase as we come to gain a more exact knowledge of the actual food habits of the species of the family, though it must be remembered that these outcroppings of a phytophagous food habit are usually only occasional, and perhaps in some cases confined to certain seasons of the year, when, like the robin, they collect a tax from the husbandman for the good that they have done him during other portions of the year.

In Europe, *Zabrus gibbus* and some species of *Amara* have been long known as occasionally destructive, and, in 1892, Dr. J. Ritzema Bos reported *Harpalus ruficornis* as destroying ripe strawberries in Goes, Zeeland, Holland. (Biolo. Centralb. XIII., p. 255.) As stated in the foregoing, Miss Ormerod, in her Reports for 1894, 1895, 1897-8-9, has called attention to similar and increasing depredations of the same species on the strawberry in England. The latter author also finds *Calathus*

latus, *C. cisteloides*, *Pterostichus madidus* and *P. vulgaris* occasionally injurious to cultivated crops.

In our own country, *Omophron labiatum* has long been known as injuring young corn in the Southern States. Mr. Townend Glover, the first United States Entomologist, as early as 1863, stated that he had observed *Harpalus caliginosus*, in two instances mounted high on grass, apparently feeding on the seeds. (Rep. Comm. Agr., 1863, pp. 565-6.) For several years prior to 1879 the writer had observed both this species and *Harpalus pennsylvanicus* feeding upon the seeds of the common rag-weed, *Ambrosia artemisiæfolia*, and the latter species was also observed feeding on a kernel of wheat, seeds of timothy and seeds of panic grass, *Panicum crus-galli*, tearing the latter out from the heads. (Prairie Farmer, Nov. 15, 1879.) In a later issue of the same publication, I also gave an account of the seed-eating habit of *Anisodactylus sericeus*, which squeezes out the immature seeds of *Poa pratensis* and devours them. In 1880 the writer also recorded the fact of *Harpalus herbivagus* feeding on the young shoots of *Poa pratensis* in early spring. (Am. Ent. N.S., Vol. 1, p. 173.) During the same year, and in the same publication (p. 251), Prof. William Trelease also recorded the fact of *Harpalus caliginosus* feeding on the seed of *Ambrosia artemisiæfolia*, while on p. 277 of the same publication, Mr. Wm. A. Buckhout stated that he had observed the insect, in 1876, feeding on what he at the time supposed to be the pollen of the staminate flowers as well as upon the seeds. Recently, Dr. Howard wrote me that Mr. F. H. Chittenden had observed hundreds of these beetles at the same time feeding upon the seeds of this same species of plant. Nearly or quite all of these observations on the *Harpalus caliginosus* feeding on Ambrosia seeds were made in September, at a time when the newly-developed adults are probably near the beginning of their career, as we usually find them hibernating in cells in the ground at the depth of several inches, and hence this is only a clue to their food habits during a particular period, and while they may and do feed largely upon the seeds of this weed at that time, they can hardly be said to favour phytophagous food at other times of the year.

In 1882, microscopic examinations of the alimentary canal in a large number of Carabidæ, carried on by Prof. S. A. Forbes, the material for which had been collected by the writer, in most instances the beetles having been captured under circumstances that would lead to a suspicion of vegetable feeding, revealed the fact that a considerable percentage of

the food found in the alimentary canals of 82 individuals, belonging to 18 genera and 32 species, was of a vegetable character. Collections not made by the writer, and coming from an orchard seriously affected by cankerworm, 71 specimens, and 10 from a field infested by chinch bug, and others from a cabbage patch that had been attacked by cutworms, indicated, in most cases, the partiality of the Carabidæ for animal food, where this was abundant and easily obtainable (12th Report State Entomologist of Illinois, pp. 105-116).

In 1885, *Agonoderus pallipes* was reported to the U. S. Department of Agriculture, from Illinois and Iowa, as damaging young corn by gnawing the seed kernels and eating the sprouting roots (Bull. 12, O. S., U. S. Dep. Agr., Div. Ent., pp. 45-6, 1886), similar reports of injury coming also to the writer from farmers in Indiana during the same year. Since that time it has also been reported to me as working a like injury in Ohio.

In 1886, Dr. J. A. Lintner reported injury to the foliage of the strawberry by *Bembidium quadrimaculatum*, in Connecticut (3rd Report State Ent., N. Y., p. 98).

From all of this it would appear that many of our Carabidæ are naturally, and by preference, of carnivorous habits, but during a scarcity of this kind of food, can subsist upon that of vegetable character.

PARTIAL LIFE-HISTORY OF DICHOGAMA REDTEN- BACHERI, LED.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The Pyralid genus *Dichogama* has not yet been reported from United States territory on the mainland, but at least three species occur in southern Florida. The following notes were made on the larva of one of them, *D. Redtenbacheri*.

Stage II. (?)—Head flat before, clypeus high, mouth pointed; luteous, ocelli black; width .4 mm. Body a little flattened, translucent, yellowish, a geminate lateral brown stripe. Cervical shield large, colourless, brown dotted on the tubercles and on lateral edge; anal plate small, not marked. Tubercles small, brown; setæ long, stiff, pale. Skin sparsely granular; segments scarcely annulate.

Stage III.—Head whitish with streaks of brown dots on the lobes converging to clypeus, mouth brown; width .7 mm. Body flattened, green from the food; a double broken lateral black band reaching from the spotted cervical shield to the colourless, spreading anal feet. Feet all pale.

Stage IV.—Head whitish, heavily black spotted except over the

clypeus; width 1.1 mm. Cervical shield transparent, black dotted at tubercles and edge. Body flat, green dorsally from the food; a white broken subdorsal line on joints 3 to 13, and double black lateral one crossing tubercles ii. and iii. Feet colourless; setæ long, white.

Stage V.—Head dark, the spottings obscured; width 1.7 mm. Body purplish dorsally (in this specimen), with distinct yellow subdorsal line on joints 3 to 13, double lateral black line and broken, pale yellow, stigmatal one. Subventral region whitish. Setæ long whitish; tubercles, except iii., minute.

Stage VI.—Apparently interpolated; width of head 2.2 to 2.5 mm. As in the next stage.

Stage VII.—Head round, the apex below prothorax, clypeus high, reaching the cervical shield in the ordinary position of retraction; antennæ as long as mandibles; whitish, with remote scattered dashes or patches of dark brown, principally in a double line on each side of the vertical notch and also in a parallel row across the centre of the lobe obliquely; width 2.7 to 3.0 mm. Cervical shield large, membranous and transparent, so that the retracted head is plainly visible through it. Anal plate concolorous with the body. Body a little flattened, segmental incisures marked; segments 3-annulate, the anterior annulet small and not reaching the dorsum. Skin translucent, not strongly marked. Greenish, a broken, yellowish white, subdorsal line above tubercle i.; a similar stigmatal line; slight whitish streaks in the lateral space; a double waved and broken lateral brown line covering tubercle iii., which is much larger than the others and conspicuous. This line varies in distinctness, sometimes being obsolete, represented only by the large dark tubercle. Slight whitish markings subventrally. Tracheal line white, its ramifications visible by transparency. Cervical shield slightly brown dotted. Feet colourless, normal. Tubercles normal; on abdomen, i. dorsad to ii., all small except iii., iv. + v., vi. single, vii. of three setæ; on thorax ia + ib, iia + iib and very large, iv. + v. Tubercles sometimes surrounded by blackish. The subdorsal and stigmatal pale lines extend over joints 3 to 12. At the end of the stage the larva turns red and seeks a place for spinning. The cocoon is composed of leaves fastened together and bitten in an ellipse, the inside lined with silk.

Food-plant.—The larvæ live among the leaves of *Capparis cynophallophora*, fastening them together with silk and hiding among the skeletonized remains, or in an abode of fresh leaves united with silk.

DESCRIPTION OF THE FULL-GROWN LARVA OF GRAPTA J-ALBUM.

BY DR. JAMES FLETCHER, OTTAWA.

On the 14th June, at one of the excursions of the Ottawa Field Naturalists' Club to Cumberland, Ont., I was fortunate enough to find beneath an elm tree (*Ulmus americana*), a full-grown larva of *Grapta J-Album*, of which the following is a description :

Length, one and one-half inches. Shape slightly fusiform, gradually tapering to the end from fourth segment. General colour, a delicate glaucous green, or white washed with green—with black spines, which from the size of the body appear to be rather sparsely distributed. The three dorsal series of spines black, springing from a bright yellow field, which is three times the diameter of the base of the spine. The head large, very bristly and tuberculate. Head black at the sides and white in front ; face white, cheeks and sides of head black, including the ocellar field and two large apical compound spines ; the cheeks black, covered thickly with large white elongated and slightly curved cone-shaped (or sugar-loaf shaped) setiferous tubercles, which are almost long enough to be called short thick bristles, each one bearing at its apex a slender bristle. These bristles are black or darkened on the tubercles of the upper and lower parts of the head. Ocellar field black and distinctly margined against the white face ; mandibles black, frontal triangle white clearly outlined with black ; head bearing on each side of apex a large, stout, conspicuous, jet black branched spine, with about five smaller sized spinelets, all of which bear black bristles at apex. Behind the cheeks and running down from the apex, being in fact a continuation of the white face, is a white band, which gives the appearance of the head being white, with a large black area on each side, which includes the apical compound bristles and the mouth-parts.

Down the dorsal area are three series of black branched spines, with 5 to 7 branches—a medio-dorsal series, a lateral series, and a supra-stigmatal series—all black and bearing from five to seven spinelets. The spines of the lateral series half as long again as those of the three other series of bristles. Spiracles black, and beneath these is a sub-stigmatal series of branched spines similar to those above the spiracles, but white ; the bristles only at the tips of the branches being slightly infuscated. The position of the branched spines of the larva is as follows : The

medio-dorsal series is one-third from the front margin of the segment. The lateral series and the infra-stigmatal series slightly posterior to the spiracle and in the same line. The supra-stigmatal series slightly anterior to the spiracle and in almost the same line as the medio-dorsal series.

Prolegs and thoracic feet white, slightly darkened towards the claws, and all pretty thickly covered with white deflexed bristles. On segment No. 2, instead of the large branched bristles which occur on the rest of the body, are simple short thick bristles exactly similar to those on the face, and each bearing at its apex a slender black bristle. The skin is white and semi-translucent, allowing the green contents of the body to show through. This together with the shape of the larva gives the caterpillar a considerable resemblance to an *Apatura* larva. The inter-segmental folds are white and the M-shaped dorsal markings of *Grapta* larvæ are white and indistinct. The pale delicate green colouring of this larva gives it a very un-*Grapta*-like appearance.

PUPATION.

On Sunday evening, June 16th, the larva was found to be suspended for pupation. At 7.15 p.m. gentle undulations of the abdomen (peristaltic motions), accompanied by straightening out and slowly drawing up of the body, were noticed, and the contents of the body seemed to run down to segments one to eight.

7.25—Last segment apparently empty.

7.27—Body drawn up several times and then straightened out, undulations running along the body as if an effort were being made by the insect to shrink away from its skin.

7.35—The bases of some of the thoracic tubercles pale as if air were under them. These were the areas which afterwards in the pupa were gilded. The skin at the base of the prolegs apparently loosening and little folds showing.

7.40—Colour of the body darkening, the peristaltic motions continuing all the time.

7.43—The muscles apparently relaxed and the body hung down almost the full length.

7.45—The body drawn up vigorously 3 or 4 times, the peristaltic motions continued energetically and with some effort.

8.00—Muscles relaxed and the body hanging down loose again without movement for about half a minute.

8.05—Body contracted and drawn up vigorously, and with a wriggling, impatient, twisting movement four or five times repeated.

8.12—The two posterior abdominal and anal prolegs apparently drawn in from the skin.

8.15 to 8.45—The body constantly drawn up vigorously, the undulating movements of the body kept up almost continuously, with three or four short intervals of rest of about a quarter of a minute each, during which the muscles were relaxed and the body hung down almost straight, the head and three thoracic segments only being slightly curved upwards.

8.45—Segments No. 12 and 13 showing minute wrinkles in the skin.

8.46—Body relaxed for a few seconds and then drawn up slowly, but more firmly and to a greater degree than previously; at the same time the body was twisted slightly from left to right, and the skin began to pass up perceptibly over the anal segments, this movement proceeding segment by segment as though the insect were crawling through the skin towards the head.

8.47—The skin burst over the 3rd and 4th segments, and by the undulating movement of the body was gradually drawn back until the chrysalis emerged; the skin on ventral surface adhering longest, and apparently the greater part of the weight of the body was borne and the body of the pupa was held from falling by reason of the moisture of the skin, which made it adhere to the soft pupa. I could detect no effort on the part of the chrysalis to hold on to the skin by grasping it between the folds of the abdomen, although this was probably the case when the cremaster was withdrawn and slid over the edge of the empty skin. This was done in a most definite manner; the empty head-case and part of the skin, being in the way, was pushed on one side, and the cremastral hooks by a vigorous gyrating motion of the body twisted into the silk. When firmly attached the body was twisted vigorously round and round for nearly three minutes, from 8.53 to 8.56, in the effort to get rid of the empty skin, the body being drawn up and curved considerably while this was being done, as if with an effort to pull the empty skin away from the silk by means of the abdominal spines, although of course the whole body at this time was very soft. At 8.56 the empty skin was thrown down, when the pupa at once hung motionless and the characteristic spines and projections expanded and took their permanent form. The mat of silk was large and loose, with several detached strands running to adjoining objects. The silk mat white, with no distinct button as in most of the

other species. Both at the time the larva was found beneath a stone in a wall at Cumberland, Ont., and in the box where the pupa was afterwards formed, there were several loose threads of silk over the body and entangled in the spines.

The chrysalis immediately after formation was of a beautiful semi-translucent emerald green, which later, and by the following morning, changed to a ruddy transparent bronze, washed with olive green. The six gold blotches on dorsum large and conspicuous. General shape of the chrysalis somewhat similar to that of *Grapta Interrogationis*, but more robust; rather larger but almost identical in shape with that of *Vanessa Californica*, particularly with regard to the outline of the thoracic protuberance.

The chrysalis formed on 17th June and the pupal period lasted 11 days. This would seem to indicate that this species, like all the other Canadian Graptas, is double-brooded, but I never remember to have seen the butterfly flying at Ottawa except in spring and autumn.

NEW HISTORIES IN HYDROECIA.

BY HENRY BIRD, RYE, N. Y.

(Continued from page 234.)

Hydroecia rutila, Gn.

This was the next discovery of the season, and as work in former years had never unearthed more than one new larval condition per season, it became evident 1899 was being especially fortunate. We may well say unearthed, as it was actually necessary to do considerable digging to get at these fellows, so far down were they in roots below the surface. The preferred food-plant is *Solidago sempervirens*, a plant particularly local to the Atlantic seaboard, and it was naturally supposed we had to deal with an insect thus restricted in its range. Other things conspired to get ideas rather elevated, for it was not known, of course, before the moth appeared what species the larva might prove. There seemed an unusual feature in that among the numerous stems arising from one root cluster, when one was found infested, there would surely be *two* examples—no more, no less—found in the bunch. This happened in every case, and occurs so often as to lose the aspect of being any coincidence. Many times but one larva would be found at first; further searching, however, always disclosed a mate. Burrowing well down

in the roots, they still have quite an extended gallery high up in the stem. The reason for this was one day apparent when a very high tide covered the marshes with several inches of salt water. In no way discomfited, our friends now make use of their upper chamber, which in cases of this kind is their only salvation. *Hydracia* larvæ when mature drown easily and are not able to withstand immersion in any such manner as do the boring genera *Nonagria* and *Bellura*.

So, taking all things into consideration, it was inferred some species quite out of the ordinary should come of it, and there was almost a disappointment when common everyday *rutila* was the final result. In our particular location, where a blackish stream meanders through the salt meadows, the food-plant grows at the very edges of the bank, and the rather novel mode of getting larvæ without leaving the rowboat was experienced. Here, too, was a good example of their fondness for location, as the old stems of last year containing the empty pupa shells were frequently met, plainly showing a residence of former generations. Plants thus situated were subjected to inundation at every spring tide, not to mention the freshets when the ice breaks up in March. The stems and root stocks are slender for the working of so large a borer, and it is ever a tight squeeze with them. So all waste material must be passed out of the larger ventilating aperture—there are several of these—and this is not made at the ground level, but some distance up in the stem, for reasons very apparent. These larvæ are not given to *Solidago* alone, but have a number of substitutes which do equally as well. Becoming mature about August 15th, they are influenced by the stay-at-home notions which most of the other species possess, so favourable to the collector, and change to pupæ within their burrows. Thirty days is about the average of this period, and the moths when emerged are attracted to light in numbers nearly equal to *nitela*; at least that is the experience at Rye.

It seems to have been an unsettled question as to how, when and where these moths deposited their eggs? From appearing rather late in the season, it was quite naturally supposed by some that the moths might hibernate over the winter and lay eggs the following spring. What little circumstantial evidence that had come to light from former studies did not, however, point in this direction, and particular pains were taken the last season to keep the moths in surroundings as nearly natural as possible so that eggs might be secured. The plan worked well and the

desired results were gained under what seemed reasonable to consider normal conditions. Nocturnal insects are of course less likely to be noticed in the act of oviposition, so it was with a great deal of satisfaction that a female *rutila* was observed thus engaged and too busy with the work in hand to mind an eavesdropper. With a nervous haste quite out of keeping with the lethargy previously displayed, she is now all animation. One is reminded of the prying movements of an ichneumon while searching out a host, or the wasps when gathering spiders for their mud houses. With antennæ in constant motion, all cracks and crevices that the plant stock afford are explored and such as furnish an apparently proper shelter may receive an ovum thrust well in out of harm's way. What seems to the onlooker as a needless amount of exploring is done, and one is struck with the important part the antennæ play in this. In the cases observed, oviposition did not occur after the third night, and the number of eggs were rather under the amount expected, never exceeding a hundred, although accuracy as to an exact count was quite out of the question. Having finished this function an exhaustion follows, in which the moth has hard work to keep an equilibrium, often falling to the ground and remaining with legs in air, feebly moving. Impelled by what we call instinct, she has now fulfilled her mission, and there remains the final tragedy which is close at hand. The average life of the imagoes of this group may be reckoned at from ten to fifteen days, the weather conditions, of course, figuring importantly, though it is likely the males often exceed this. The egg is less than spherical, flattened at the vertex so that the diameter here is less than the lateral measurement, which is $\frac{1}{16}$ of a millimeter. It is ribbed very closely with rows of fine granulations, radiating from the vertex, which is indicated by a slight depression. Colour is pale, shading somewhat yellowish. They are deposited singly or in pairs. Examination of these ova in the early winter revealed the fact that all had hatched, thus adding another instance where the unexpected had happened. From the late date, we may presume hibernation occurs before the first moult, but as the wire cloth of the insectary offered no hindrance to such small fry, any statements here are mere guesswork.

Mature larvæ are very cylindrical; the longitudinal stripes, though faint, are traceable and unbroken; in this respect, as well as entire general appearance, it resembles *cataphracta* very strongly. The thoracic segments show very light, the rest of the body has the brownish body

colour more in evidence. The head, shield and plate are light in colour, shining, and of normal proportions. The spiracles are all black; the tubercles are umber and do not stand out very strongly. On thoracic joints two and three, I. a and I. b are hardly discernible; II. b, III. and IV. in their triangular setting are less noticeable than ordinary, the first named very small, the second intermediate, and the last large, of the size usually seen. On seventh abdominal segment IV. is situated at the upper corner of the spiracle, indicative of a root borer. All legs light, the crochets alone showing black. The head, lacking the side line, measures .12 inches across; the entire length of larva is 1.7 inches. Maturity is reached about August 19.

The pupa is very cylindrical; colour a light chestnut brown. There is little divergence from the usual form, though attention might be drawn to the conspicuousness of the eyes, showing darkly through the shell. The anal segment is also much darker. The cremaster consists of two sharp parallel spurs. Length .8 inches; duration of condition about twenty-eight days.

Previous to the pupal change the larva makes a slight attempt at lining or plugging a portion of its burrow with bits gnawed from the harder parts of the stalk and fastened with a few silken shreds, this acting as a sort of cushion upon which the pupa rests. This has been noticed occasionally with other species, but seems the rule with *rutila*. An irregular opening for the moth to escape is made through the epidermis, but this outer skin is left intact. In a few days it becomes black, looking like a blister or contusion, and offers a point upon which the collector may profitably work. There being no swellings and only an occasional dead stalk, it is often a hard matter finding these fellows.

Hydræcia impecuniosa, Grt.

Never for a moment had this species been considered as belonging to the local fauna; indeed, such a rarity seemed quite out of ordinary reach. The few scattering examples that had found their way into collections, though showing it widely distributed, were so insignificant in point of numbers that a "round-up" of goodly proportions was especially gratifying. The discovery of the larva savours so of luck, pure and simple, that a statement of the case may not be without interest.

The large number of *Hydræcia* larvæ that were desired for comparison last season made special effort necessary, and one day when gathering in a quantity of *cataphracta*, which happened in this case to be boring

wild parsnip, an *impeccuosa* larva was very unexpectedly forced upon our notice. That the parsnip stocks might the more easily be examined, for they were growing amidst a thick and tangled undergrowth, the stems were pulled up roots and all and were then split open carefully so as not to injure or lose the enclosed larva. By some chance a small weed was caught in the hand and came up by the roots along with the parsnip. Imagine the surprise when seeing at the base of this weed, which proves to be some kind of *Aster*, a large exit aperture, clearly the work of an *Hydrevia*, and inside a larva entirely new and quite ready for pupation. What it would prove was of course not known at the time, but it was gladly welcomed as extending an acquaintance to one more species. Later, several pupæ were secured, enough, presumably, to establish the identity of the species, the intention being that more complete observations be reserved for another year. Luckily one of the lot emerged very early, and knowing the species to be of such unusual occurrence, we deemed it well worth while giving up some time to further searches for more. Five hours spent the following day in a favourite resort brought ninety-seven pupæ to light, quite ready to give up the imagoes, having the wing-cases dark coloured by reason of the partly-formed organs within. Such a windfall was certainly very pleasing of itself, yet it could not but convey the unflattering conviction that with the supposedly careful work in former years this species had unquestionably existed all the while in a locality constantly examined and yearly giving up a goodly number of other species. Such an occurrence is but another point in the evidence that goes to show more depends on knowing where, than how, to look.

The food-plant is *Aster umbellatus*, and work is carried on mainly in the root, although the lower part of the stem is also tunnelled. Procedure is as usual, perhaps the strongest individual characteristic being the very large and irregular opening made for the moth's escape. This is situated an inch or so above the ground level, the stalk being often eaten half off through to the epidermis, and would surely fall were it not that it grows in such dense clusters the spreading branches of one plant help to support others. The epidermis, of tissue paper consistency, soon becomes dried and black, and as there are generally a number of perforations about the edge, it often shrinks, tears away at some point, then hanging as a hinged lid. There is not, however, any such accuracy of workmanship as is displayed by *necopina* in this act. Situated so conveniently, we might imagine these pupæ to be greatly exposed to the attacks of skunks and

other insectivorous marauders, but observations so far have noticed no such depredations. Though parasitic troubles seemed few, a good proportion fell victims to a fungous growth, this latter often assuming fantastic shapes as its development encloses the chrysalis. It may be that this fungus is not directed primarily against the insect, as its growth was often seen lining the whole interior of the burrow with a fine network of fibrous tendrils, and in many cases the ripe pupa, very much alive, was wriggling around upon a bed of this material. It was this feature, that of seeing a *live* pupa in direct touch with such apparent contamination, which seemed remarkable, for in all previous experiences where any mould or mildew was to be noted about a burrow the pupa would always be as dead as the proverbial door nail.

Eggs were obtained October 9th from females confined with the growing plants, and were practically identical with those of *rutila*, excepting the colour shades to greenish rather than to yellow. They are deposited in rows or clusters of a dozen or more, and, like that species, gave up the young larvæ in the late fall; just when, will have to be determined another year.

Mature larva: Size is small and at once separable from the other closely allied species. Its colour, a flesh tint, is purest white on the first three segments, and there is not the semi-transparency so usually noted. Head is of moderate proportions, a shining red russet in colour, and lacks the black side dash; measures .09 inches. Shield is lighter and yellowish, strongly edged at the sides with black. Anal plate large, darker in colour and blends with what is sometimes a preceding plate into one confused area. The body, while of the usual cylindrical build, shows a perceptible tapering on the last two joints. Tubercles prominent, shining black, and stand out contrastingly as in *purpurifascia*. On abdominal segments I. exceeds II. in every case, and IV. is notably large. The position of the latter on joint seven is high up above the corner of the spiracle, the apparent root-boring characteristic. The setæ are few and weak. Thoracic feet black, as are the crochets of the abdominal ones. Mature larva measures 1.3 inches. They change to pupæ August 15 to 25.

The pupa is of the usual glossy chestnut brown, very cylindrical; the indentations between the abdominal joints are slight; length .8 inch. A noticeable feature is the very dark hue assumed by the wing-cases just previous to emergence, the abdominal part retaining to the last the original light shade. Moths emerge about September 30.

The thoracic tufting of this species from its smaller size seems more prominent than in some others. Indeed, this character so noticeable throughout the group can only be fully appreciated by securing moths direct from pupæ and which have not marred their beauty here by flight. The rather loose, though ample, vesiture of the thorax is so well blended with certain ground colours of the primaries, together with minor peculiarities of the anterior tufts, that it is quite possible to separate the species by the thorax alone when unfaded, perfect material is at hand. This may seem a rather broad statement, yet it is the lack of perfect material that has resulted until recently in the confusion of certain species.

Mr. Grote, when conducting his studies in the earlier days, gives a figure (Papilio, pl. 1, Vol. II.) showing a profile view of *rigida* that illustrates nicely the proportions of this tufting.

Hydræcia Harrisii, Grt.

A number of mature larvæ of this species came into my possession last season, due to the kindness of Dr. Roland Thaxter, who has long had this insect under observation at Kittery Point, Maine. That section so far seems the only one which has produced this species in numbers; the examples in collections invariably bear that locality label. As its food-plant and early history have already been discussed by my donor who furnished the types for the original description, the references here will have only to deal with some of the tubercle arrangements which are of interest by way of comparison, for there were some suspicions at the start that it might prove a variety of *purpurifascia*. So great was the similarity between these larvæ and the one found working in *Cicuta*—both, in fact, being *Umbelliferae* feeders—that it was thought possible the local and the Maine examples might be the same until emergence proved the contrary. Since, comparisons of blown larvæ have pointed out sufficient structural differences; but a slightly greater size in favour of *marginidens* seemed at first the only apparent discrepancy.

Mature larva: General dimensions are typical, colour the light indistinct translucence. A dorsal stripe is vaguely seen, apparently dependent on the pulsating internal fluids for accentuation. Head measures .11 inch across; shield and anal plate ordinary. Tubercles are

prominent, for the most part shining black. On thoracic joints two and three, III., IV., and V., are most prominent, placed in the conventional triangular form; III.a is in evidence on all abdominal segments before the spiracles. On the seventh one, IV. is below the spiracle in the usual noctuid position, and so differs in this important point from *purpurifascia*. Leg plates are ordinarily distinct. Extreme length 1.65 inches.

Of other *Hydroecia* species to be associated with these, there remain two known to occur at Rye, which have so far escaped notice in their earlier stages. These are *inquesita*, G. & R., and the newly-described *circumlucens*, Sm. The former has a wide range and is represented in most collections, but one rarely sees a perfect example. It is a rather thinly-scaled species, and suffers so much from the effects of flight that it has long been sought in its larval state, so that perfect examples might be secured, for it is prettily shaded with the characteristic warm red-brown and purple of the group. It is probably a root feeder and confined to one variety of plant; just what one, though, remains as yet a nut to be cracked.

Circumlucens occurred to me some years ago, a single example having the temerity to fly in at an open window. It appears early in the season, ranges well northward, and may be considered an associate with *cerina* and *rigida*. A happy day, indeed, will it be when this species gives up its secret of food-plant and habit.

The few European species that are closely allied with the local ones under consideration seem equally scarce in collections there, as many of our species have heretofore been in American cabinets. This is likely due to ignorance of their early histories, and it may afford us some satisfaction to think we are at all abreast of our brethren on the other side, even in this small matter, since we are so far behind in a knowledge of life-histories generally. *Leucographa* as approaching our *rutila* and *xanthens* slightly similar to *marginidens*, are robust insects and must have great burrowing larvæ, which have burrowed to good purpose, indeed, if they have escaped the generations of lepidopterists there who are ever on the lookout for fresh details.

NOTE ON THE GENUS DYARIA, NEUM.

In re-examining the old slide from which the figure of venation (CAN. ENT., XXV., 214) accompanying the original description of this genus was made, I see distinctly three internal veins in the hind wings. It would appear as if one of them must have been obliterated by the balsam in the fresh mount, or else an error of observation was made. The correction refers the genus to the Pyralidæ and, according to Hampson's classification, to the Epipaschiinæ, where it appears allied to the Indian genus, *Cænodomus*, Wals. (Hamps. Trans. Ent. Soc., Lond., 1896, 467.) I would not lay any stress on the apparent presence of the accessory cell in *Dyaria*. Vein 10 runs so closely approximated to the stalk of 6-9 that it is impossible to be sure whether there is a true anastomosis toward the tip or not in the single specimen mounted.

It is rather curious that the error in Mr. Neumoegen's figure has been exactly paralleled by Prof. Aurivillius, who figures *Alippa anomala* (= *Cænodomus Hockingii*) with only two veins in the hind wings. He referred his genus to the Limacodidæ! This figure (*Alippa* = *Cænodomus*) much more nearly resembles *Dyaria* than Hampson's does; in fact, there is no tangible difference, as he gives vein 6 stalked, and specially illustrates vein 10 running close to the stalk of 6-9, and nearly touching this at the bend before apex. He also italicizes the words, "vein 8 of hind wings touching 7 beyond the end of the cell." (Ent. Tid., XV., 176, 1894.)

At my request, Dr. Hulst has examined the type of *Dyaria* in the Neumoegen collection, and says: "Palpi upturned, thickly scaled in front, rather short, not over half of the front, end joint very inconspicuous, basal joint not hollowed out; maxillary palpi very small." In the ♀ before me the maxillary palpi are small, tufted with scales at the end. Of the antennæ, Dr. Hulst says "strongly bipectinate for two-thirds, then rather suddenly shortening, the rest filiform. Process present behind at base, fringed and crowned with long hairs." *Dyaria* may therefore be referred to the Pyralidæ near *Cænodomus*. Its occurrence in North America needs verification; in spite of the positive statement published.

HARRISON G. DYAR.

TWO NEW SPECIES OF JASSIDÆ.

BY HERBERT OSBORN, OHIO STATE UNIVERSITY, COLUMBUS.

Deltocephalus apicatus, n. sp.—Head and pronotum yellow; scutellum and elytra reddish fuscous, the latter with hyaline apex. Length to tip of elytra, ♀ and ♂, 3 mm.

Vertex about as long as width between the eyes, margin rounded, apex prominent; front with sides nearly parallel to below the antennæ, then curving sharply to the base of the clypeus; clypeus slightly narrowed to tip. Pronotum, width more than twice the length, lateral margin short, posterior margin straight. Elytra passing the abdomen, with fully formed apical areoles (macropterous), or reaching only to tip of abdomen, with the apical areoles very much abbreviated.

Colour: Vertex, face and most of the pronotum yellow; ocelli black; very faint whitish parallel lines on the posterior part of the vertex, and in some specimens faint arcs on the front; three whitish lines on the pronotum; more or less of posterior part of pronotum, all of scutellum, and the elytra as far as the apical transverse veins, reddish brown or fuscous, fading apically to hyaline or with all the apical areoles hyaline. Beneath, sordid yellow, with the venter washed with fuscous.

Genitalia: Ultimate ventral segment of the ♀ moderately long, the lateral border sloping, the hind border slightly bisinuate and with a spot each side of middle extending on to disk and giving a trilobate appearance to the border; pygofer nearly reaching tip of ovipositor, thickly set with bristles on posterior half. ♂ valve rather long, anterior border strongly curved and posterior border evenly rounded; plates long, nearly reaching tip of pygofer, contracting sharply from base to middle, then tapering uniformly to narrow tip; pygofer thick, white, thickly set with short bristles.

Described from eleven specimens, four ♀s and seven ♂s, representing localities as follows in Eastern U. S.: 1, Md. (Mally); 1, Riverton, N. J. (Johnson); 1, Hyattsville, Md. (Hine); 2, Washington, D. C. (Hine); 3, Woodstock, Vt.; and 2, College Park, Md. (Ball).

This is a very characteristic little species, and shows a distinct dimorphism in a form with shorter elytra with imperfect apical areoles.

Paramesus furcatus, n. sp.—Beautiful golden yellow, with milky hyaline spots on elytra. Median lobe of ventral segment furcate. Female length to tip of elytra, 7 mm.

Vertex smooth, slightly depressed behind sharp anterior margin,

obtusely angulate, half as long as width between eyes and one half longer at middle than next the eye; front smooth, sutures converging regularly to base of clypeus, which is slightly wider at apex than base. Pronotum with a rather deep sinuous impression parallel to the anterior border, behind which it is faintly rugulose, posterior border scarcely concave.

Colour: Vertex bright yellow, unmarked; face yellow, with a fine black line just beneath the border of the vertex and extending to beneath the ocelli. Pronotum golden yellow, with faint median milky line. Elytra fulvous yellow or golden with metallic lustre and numerous oval milky hyaline spots arranged between the nervures and in the areoles of apical portion, an oblique fulvous fascia from basal third of costa to tip of clavus. Beneath uniformly yellow, except tibial and tarsal spurs, claws and the tip of median process of last ventral segment, which are fulvous or reddish, the tarsal claws inclining to fuscous.

Genitalia: Last ventral segment with broad lateral lobes, the inner borders of which run nearly straight to base of median process, which is strong, shallowly furcate, the spurs turned dorsad.

Resembles *vitellinus* in general colour and marking, but distinguished by the more slender form, the more angular vertex, the more deeply cut median process of last ventral segment, as well as the more brilliant metallic golden colour and greater length.

Described from one female received from Mr. O. O. Stover, of Orono, Me., who collected it at Pownal, Me., August 31st, 1899.

CORRESPONDENCE.

SIR,—While I thoroughly concur in your decision to exclude all further discussion of the Cunea-Congrua question from the CANADIAN ENTOMOLOGIST, especially in view of the very personal character which the controversy has assumed, I trust you will grant me space for the following brief personal explanation.

My reference to the Boers of the Transvaal was not intended to be offensive, and I have personally the greatest admiration for the stubborn courage in support of a hopeless cause shown by those misguided men, but as Dr. Fyles appears to have considered it offensive I beg leave to withdraw it.

I did not mean to imply that it was heinous to suggest that Dr.

Riley might have confused two or more species, as that has been done by many eminent entomologists, but to make figures with sufficient latitude to include such distinct species as *Hyphantria Punctatissima* and *Spilosoma Antigone* would be much less excusable. I certainly appear to have misunderstood Dr. Fyles on one if not two minor points. It is strange that so many of us have misunderstood him. While I am considerably younger than Dr. Fyles, which, however, is hardly relevant to the controversy, I am perfectly aware of the meaning of "bilateral symmetry," and in my copy of Smith & Abbot the figures of *Punctatissima* are perfectly symmetrical and not at all as described by Dr. Fyles.

But when an author illustrates the larva of a species on its food-plant and figures the perfect insect on the same plate, does he really thereby imply that all stages are to be found on the same plant at one time? And might Mr. Edwards's magnificent plate of *Melitæa Phaeton* in *But. N. A.*, Vol. II., be therefore properly described as "quite a fancy sketch"?

It is quite true that I have never had Dr. Fyles's specimen in my possession, he having refused to allow me to take any of his specimens to compare with Walker's types in the British Museum, but I have seen it several times as well as other specimens of the same species which I have seen in several museums which I have recently visited, and I have had Mr. Winn's two specimens of the same form in my possession for weeks together, he having kindly permitted me to carry them to New York, Philadelphia and Washington, and just recently to the British Museum.

Internal and external are antithetic terms, but superficial was quite properly used by me to denote a slight general resemblance in maculation which, however, in my opinion disappears upon a more careful study of the details.

HENRY H. LYMAN.

Montreal, 16th July, 1900.

STR,—July 6th was a very hot day in Orillia, over 90° in the shade, and the night still remained very warm. I, as usual, was at my favourite occupation of collecting; I had made several trips to the places which I keep regularly covered with rum and molasses during the season. This evening there was literally no standing room for the myriads of moths which crowded each other to get at the sweets. *Hadena arctica* was swarming—never saw so many in my life, and I have had quite a few

years' experience at sugaring. At light and sugar this evening I could have taken some 58 species of moths, though of course nearly all were represented in my collection. I have succeeded each year during the last eight years in adding from 18 to 25 new Heterocera to my collection, and hope to beat the record this year, but I certainly received a genuine surprise this particular night. I had made two or three rounds with cyanide bottle *only*, when on nearing one sugar station something that appeared immense to me flew away from the locality. I thought at first it was Polyphemus, but what could it be doing at sugar? Then perhaps a Catocala—never saw one so large. Though I had no lamp, I was satisfied at last it was something new; went into the house and got my net and made several trips to the same spot—no results. I said to myself, Well, I will wait for you, and sat down and lit a cigar. I was about two yards from the spot where I first saw the apparition. I waited patiently for about half an hour. Presently along came the same bat-like insect, and, after a few circles, alighted on the post and commenced sucking in the sugar along with the numerous moths—a giant among pigmies. As soon as it was at rest, I knew it at once as *Erebus odora*. I watched it feed awhile, a thing I never expected to see. After I netted it, I found it to be a fine female—looked as if it had just emerged from cocoon—abdomen was quite soft and scales in perfect condition. This I think, under the circumstances, is a very interesting capture, as I understand all previous ones made, in Canada at least, have occurred late in the fall and in out-of-the-way places, and it has been supposed they had wandered here from the South; but here is a perfectly fresh specimen, taken in the middle of summer, apparently quite at home and taking his sweets along with the rest of the Canadian moths. My own notion is it was bred in Orillia.

C. E. GRANT, Orillia, Ont.

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CONTENTS.

| | | | |
|--|-----|--|-----|
| Grote—The principle which underlies the changes in the Neuration..... | 289 | Beutenmuller—Food-habits of Sesiidæ..... | 301 |
| Grote—Types of Noctuid genera..... | 292 | Titus—Notes on Colorado Bees..... | 303 |
| Robertson—Nomada Sayi and two new species..... | 293 | Dyar—North American species of Tineidæ.. | 305 |
| Ashmead—Classification of the Fossorial, Predaceous and Parasitic Wasps..... | 295 | Ehrhorn—New Coccidæ from California. . | 311 |
| Cockerell—New Mexico Bees..... | 297 | Aldrich—A question of Nomenclature..... | 318 |
| | | Webster—The Purslane Sawfly..... | 318 |
| | | Book Notice—Argynnis of North America.. | 319 |

THE PRINCIPLE WHICH UNDERLIES THE CHANGES IN THE NEURATION.

BY A. RADCLIFFE GROTE, A. M., HILDESHEIM, GERMANY.

In developing a general view of the changes in the neuration of the lepidopterous wing, the mass of detail in any one paper may obscure, for the reader, the statement of the assumed plan of progression. This seems to be, briefly, a simplification of the longitudinal systems of veining, and attained through a process of reduction. Where this progress would interfere with the serviceableness of the organ, the dormant tracheæ in the tegument may, in special cases, develop accessory veins, such as the humeral spurs of the Lachneids, the cross branches and extra veins in Tineides, and, as I have suggested, the so-called precostal spur (at one time vein I. of Comstock) on the hind wings of the diurnals. The cubital and discal cross-veins may be, however, survivals of a former system of cross-veins, since we apprehend them in various stages of retrogression. But they may be also what I call sub-secondary: produced at one time to be abandoned at another. Still, this latter is a rather violent theory. It is better to adopt the view that there is a general simplification going on controlled by mechanical causes and subsidiary to the habit and changes in habit of the organism, and which includes these two cross-veins.

In this general movement the participating longitudinal veins are as follows :

The branches of the radius.

These, on primaries, are still oftenest of the primitive number, five ; on secondaries Comstock shows that the first radial branch survives some-

times as the outer margin of the humeral cell, fusing above with subcostal. The movement here is longitudinal, from base of wing outwardly to external margin. On the primaries some of the most specialized forms of Pierids and Lycænids have only three branches remaining. On the hind wings the radius is already two- or one-branched; the remainder of the five primitive branches have been lost in the higher lepidoptera, but retained in *Hepialus* and the Micropterygides. The details of the process by which the radial branches of the fore wings have been reduced in number become apparent through a comparison of their present position in the various genera.

The branches of the media,

which, as a rule three in number, alone survive of the system, are situated between cross-vein and outer margin of the wing. The base of the median system, as shown by Comstock, has disappeared and is again only exhibited in the Tineides. This base consisted of two, at least, longitudinal veins, which traversed the discal cell, and the traces of which are now to be found in certain backward spurs which remain attached to the cross-vein on its inner side. The reduction has taken place from the base outwardly. The branches themselves move upwardly or downwardly, attaching themselves to the system of the radius or that of the cubitus; the cross-vein degenerating as a further stage in the disappearance of the median system. For this is doomed. The wing tends to divide into two halves—the radius and its system, the cubitus and its system. To the first belongs naturally, by position, the subcostal vein; to the latter, the anal veins. The most perfect examples of this reduction are found in the Attacinae. Take our common *Samia cecropia* or *Philosomia cynthia*. Here the cell has opened, the discal cross-vein has vanished, the branches of the media have attached themselves to the radial and cubital systems, deriving their nutrition from these, and the wing is centrally opened, from external margin to base, and free from veins. It presents now a certain coincidence with the embryonal or pupal wing, which is in itself curious, but need not detain us. We must finally notice the fact, that sometimes the branches refuse to follow the attraction of the upper and underlying systems. It is the middle or second median branchlet which is decisive. When this becomes radial, it follows the first median branch and attaches itself to the radial system. When it becomes cubital, it follows the third median branch and attaches itself to the cubital system. But sometimes it remains neutral. It will

not go either way, but obstinately retains its original primitive central position. This happens in the Skippers and Noctuids. The result is that the vein becomes isolated by the disintegration of the supporting discal cross-vein, a process which is never stayed. Then the second median branch, deprived of support and nutriment, fades away. For particulars of this theory of the movement of the median branches, see various articles issued by me in the years 1897 to 1899. The radial position is assumed by the Pierids and Nymphalids, also the Nemeobiidæ. The cubital, by the Papilionides and Dismorphians, which latter include *Leucophasia*. The central position is retained by the Skippers, apparently yielding to the cubital in the Megathymidæ. The movements of the radial branches and the median may be traced in all lepidoptera. Although I have worked them out chiefly from the diurnals, they are intelligible only as part of a system generally applicable. All genera of butterflies show the wings in comparative stages of advance in this respect. For instance, let us compare the wings of *Parnassius* with those of *Papilio*. These movements, which are frozen in the Swallow-tails, are released in the Apollo butterfly and its kindred; in other words: *Parnassius* is seen to be here the specialized and *Papilio* the relatively generalized form. I say *relatively*, because all these changes are gradual and one form must be compared with another to ascertain the difference in extent of these two movements. The grades are innumerable, established by the delicate differences of these natural instruments of measure. Another truth, which I have dwelt upon elsewhere, may now find its place: *The specializations*, of the two systems and of all other features in the wing, *are unequal*. This prevents snap judgment as to which is *ahead*, and which is *behind*, when we discuss the position of different groups and endeavor to establish it by a single feature. Rank is not an absolute and determinable condition in all cases; the specializations of moths may exceed those of butterflies. Moths may represent younger forms and butterflies may be older than we might suppose. We now come to

The anal veins,

which are theoretically four in number. The first anal (submedian fold) has disappeared as a vein, and appears only as a fold in most generalized forms. The fourth and third anal veins depart one after the other; the second anal is alone permanent. The Hesperiadæ have two anal veins remaining, the second and third; the Papilionides only one, the second.

The stationary veins

in the lepidopterous wing are, then, the subcostal, the main stem of the radius, the cubitus with its two invariable branches (cases occur in which a fourth median branch is noted), and the second anal vein.

It remains to state that accessory or secondarily developed veins always seem to be joined on to other veins, their object being to strengthen the tegument in some particular part of the wing which the changes above detailed have left weak. A curious way in which veins have become bent, in order to support the peculiar shape of the wing, has been detailed in my papers on the "Round-wing," *Pseudopontia paradoxa*. Another curious case is that of the fusion of the first and second radial branches, just before tip of fore wing, in *Percute callinice*. The first radial here fails to reach the outer margin, and the object seems to be to strengthen the apical field, left weak by the reduction of the radial branches.

If this localization of the secondary veins, which I assume, be correct, it follows that all veins issuing from base of wing are, *ipso facto*, primary, carried over from primitive types of insects. The short, downwardly curved internal vein, which I have taken as the visible sign of the Papilionides, is, then, a true third anal vein, or what remains of one, and is not to be considered as of secondary origin and value.

TYPES OF NOCTUID GENERA.

BY A. RADCLIFFE GROTE, A. M.

In reference to my previous paper (page 209), Mr. Louis B. Prout kindly draws my attention to the fact that Duponchel, Lep. Ent., March, 1829, also selects *didyma* as type of *Apamea*, Ochs., 1816. While it is gratifying that I had come independently to the same conclusion with regard to this type, I cannot follow Duponchel's selection in other cases. I merely state the fact here, reserving details for a later occasion.

It further appears from Mr. Prout's researches that Curtis, who publishes later than Duponchel, viz., in May, 1829, "chooses *chryso-grapha*" as type of *Apamea*. Independent of the fact that this choice is rendered nugatory from Duponchel's prior action, I do not identify this name with certainty as referring to one of Ochsenheimer's original species of *Apamea*. Great confusion has been caused by the double employment of *nictitans* for two distinct forms. It was owing to the fact that I incorrectly supposed Ochsenheimer's *nictitans* (= *oculea*) was Linne's

species, our common *Hydræcia nictitans*, L. (= *americana*, Speyer ; *lusca*, Harris), that I used *Apamea* at one time for this species. The species *leucostigma*, type of *Helotrophia*, Led., formed one of Guenée's original species of *Hydræcia*, Guen., Noct. Eur. Index Meth., 1841, as also of Ochsenheimer's *Apamea*. But, in 1852, Guenée referred *leucostigma* back to *Apamea*, leaving *nictitans*, L., as type of *Hydræcia* by process of exhaustion.

Mr. Prout's kind communication does not affect the conclusions I have reached so far as to types of Noctuid genera.

NOMADA SAYI AND TWO RELATED NEW SPECIES.

BY CHARLES ROBERTSON, CARLINVILLE, ILLINOIS.

In Trans. Am. Ent. Soc., 20 : 276, 1893, I described *Nomada Sayi* from eight female and fifteen male specimens. At present I have forty-five female and ninety male specimens which I have referred to this species, but which I now propose to describe under the three following names :

Nomada Sayi, Rob.—♀. Mandibles simple, antennæ long, joint 4 longer than 3 or 5, as long as 12, or nearly so, pygidium rather broadly truncate ; scutellum sub-bilobed, prominent ; enclosure of metathorax coarsely reticulated at base, finely roughened beyond ; head and thorax closely and coarsely punctured ; abdomen shining, rather sparsely and finely punctured ; ferruginous, the scape, front and middle legs, tubercles and tegulæ, more yellowish ; about antennæ, about ocelli, occiput, band on mesonotum, middle of metathorax sometimes, band from wings to middle and hind coxæ, base of femora behind more or less, sometimes hind metatarsi, base of abdomen, sometimes apical margins of segments more or less, and sutures, generally black or blackish ; segments 2 and 3 of abdomen with a yellow spot on each side ; wings hyaline, marginal cell and apical margins clouded, basal nervure ending before transverse median. Length, 6–8 mm.

♂.—Resembles the female ; joint 4 of antennæ longer than 3 or 5, as long as 13, or nearly so, 5–8 sub-lobate at apex beneath : pygidium bifid ; black, mandibles, labrum, clypeus, sometimes a spot above, inferior orbits as high as antennæ in front and usually at base behind, and scape in front, yellow ; sometimes a ferruginous spot at summit of eye ; flagellum yellowish ferruginous, except towards base above ; collar black or with a yellow or ferruginous interrupted line ; tubercles, tegulæ,

and usually a spot on pleura, yellow; scutellum black or ferruginous, or with two ferruginous or yellow spots; postscutellum usually black, sometimes ferruginous; legs, except base, especially behind on middle and hind pairs, ferruginous, front and middle legs more yellowish in front; abdomen except base and apical margins of segments more or less ferruginous, yellow marks on segments as follows: A spot on each side of 1-5, sometimes continuous, or nearly so, on 2, 4 and 5, sometimes broken in two on 4, often wanting on 1, 4 and 5, and a transverse spot on 6. Length, 6-8 mm.

Carlinville, Illinois; 18 ♀, 26 ♂ specimens.

Nomada illinoensis, n. sp.—♀. Closely resembles female of *N. Sayi*; antennæ shorter, joint 4 longer than 3, a little longer than 5, distinctly shorter than 12; scutellum a little less prominent; pygidium broader, broadly rounded, not truncate, more densely and finely punctured, more densely clothed with appressed pubescence; sides of face below more yellow; abdomen with a spot on each side of segments 2 and 3; 5 with a transverse spot, usually divided, sometimes wanting. Length, 6-8 mm.

♂.—Resembles the male of *N. Sayi*; joint 4 of antennæ shorter than 13. Length, 6-8 mm.

Carlinville, Illinois; 26 ♀, 54 ♂ specimens.

Nomada parva, n. sp.—♀. Resembles the female of *N. illinoensis*, but is a little smaller; joint 4 of antennæ longer than 3, about equalling 5, shorter than 12; abdomen with a yellow spot on each side of segments 2-5. Length, 5 mm.

♂.—Scape stout, joint 4 of antennæ longer than 3, a little longer than 5, much shorter than 13, 5-8 not sub-lobate at apex beneath; pygidium bifid; black, mandibles, labrum, clypeus except sometimes at base, lower anterior orbits, scape in front, flagellum except at base above, tubercles, tegulæ, sometimes a spot on pleura and legs in front, yellow; abdomen reddish, segments 4-6 more or less blackish; yellow markings on segments of abdomen as follows: A spot on each side of 2 and 3; one or two spots on each side of 4, sometimes wanting; a band on 5 narrowed or interrupted medially, and sometimes a spot on each extreme side, all sometimes wanting; a transverse spot on 6. Length, 5-6 mm.

Carlinville, Illinois; 1 ♀, 10 ♂ specimens.

N. Illinoensis ♀ may be distinguished from the female of *N. Sayi* by the form of the pygidium and the joints of antennæ. All of the specimens of *N. Sayi* ♀ have the abdomen four-spotted. In all except two specimens of *N. Illinoensis* ♀ the abdomen is five-spotted, or six-spotted, when the mark on segment 4 is broken in two. The single specimen of *N. parva* ♀ has the abdomen eight-spotted. I separate the ♂ of *N. Illinoensis* from that of *N. Sayi* by the joints of antennæ. In *N. parva* ♂ the scape is stouter, and the ornaments of abdomen are different.

N. Sayi is closely related to *N. Cressonii*, differing mainly in size and colour.

CLASSIFICATION OF THE FOSSORIAL, PREDACEOUS AND PARASITIC WASPS, OR THE SUPERFAMILY VESPOIDEA.

BY WILLIAM H. ASHMEAD, ASSISTANT CURATOR, DIVISION OF INSECTS,
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(Paper No. 3.—Continued from page 188.)

SUBFAMILY II.—Ageniinae.

The majority of the species falling in this subfamily are usually smaller and much less conspicuous than those in the other subfamilies, and with totally different habits. None are true diggers, but, on the contrary, build small oblong, or oval, clay cells, beneath the loose bark of old trees, under stones, or in crevices in old stone walls, etc., not unlike some of the Potter wasps (*Eumenidae*).

The group comes evidently nearest to the *Pepsine*, the females having, as in that group, a transverse grooved line, impression or emargination on the second ventral segment. From that group, however, it is at once separated by the difference in the legs, the hind tibiæ being smooth, never serrate or spinous, or with a longitudinal ridge, but, at the most, with only a few very minute, scarcely perceptible spines.

These characters readily distinguish the *Ageniinae* from all other Pompilids.

The beginner at first might possibly confuse some males in this group with some small males belonging in the subfamily *Pompilinae*, since there is a superficial resemblance in some, but strongly spined legs, always existing in the males of the latter group, ought readily to differentiate the two.

Only five genera fall into this group, distinguishable as follows :

Table of Genera.

Cubitus in hind wings *interstitial* with the transverse median nervure... 2.
Cubitus in hind wings originating *beyond* the transverse median nervure... 4.

2. Mesosternum normal, unarmed..... 3.

Mesosternum armed with a large conical tooth or spine just before the middle coxæ.

Second and third cubital cells along the cubitus subequal, the third the broadest ; femora in ♂ much

thickened... (1) *Macromeris*, Lepel.

3. Second and third cubital cells equal, or very nearly, united only about as long as the first.

Mandibles simple, edentate ; antennæ in ♂ with the flagellar joints pectinate (♀ unknown)..... (2) *Clavelia*, Lucas.

Mandibles bidentate ; antennæ in ♂ normal, the hind coxæ produced anteriorly into a conical tubercle, in ♀ simple ; metathorax with a median longitudinal

furrow..... (3) *Paragenia*, Bingham.

Second cubital cell much shorter than the third ; clypeus usually triangular, more or less prominently pointed, subconvex medially ; mandibles dentate ; antennæ filiform..... (4) *Pseudagenia*, Kohl.

4. Third cubital cell, along the cubitus, as long or a little longer than the second ; claws cleft or with a tooth near the middle, rarely simple ; eyes extending to base of mandibles ; abdomen with a constriction between segments 1 and 2.

Body variable ; head transverse, wider than the thorax ; maxillæ in ♀ with a bunch of long, beardlike hairs at base ; abdomen ovoid, sessile, subsessile, or briefly petiolate ; claws cleft or with a tooth beneath..... (5) *Agénia*, Schiödte.
= *Pogonius*, Dahlb.

Body very slender ; head lenticular ; maxillæ in ♀ normal, not bearded ; abdomen very long, subcompressed, clavate, the first segment distinctly petiolate ; claws simple..... (6) *Stenagenia*, Saussure.

THE NEW MEXICO BEES OF THE GENUS *CÆLIOXYs*.

BY T. D. A. COCKERELL, EAST LAS VEGAS, N. MEX.

Table to separate the females :

- Legs red 1.
 Legs black, or only tarsi red 4.
 1. Anterior edge of clypeus deeply emarginate *Sayi*, Rob.
 Anterior edge of clypeus not emarginate 2.
 2. Ventral apical plate of abdomen broad; dorsal abdominal segments closely punctured in the middle *deplanata*, Cress.
 Ventral apical plate of abdomen narrow 3.
 3. Base of abdomen black; dorsal abdominal segments rather closely punctured in middle *octodentata*, Say.
 Base of abdomen red; dorsal abdominal segments very sparsely punctured in middle *mentha*, Ckll.
 4. Apical dorsal plate prominently angled at sides. *rufitarsis*, Smith.
 Apical dorsal plate not angled at sides 5.
 5. Apical ventral plate long and narrow, notched at sides near end. 6.
 Apical ventral plate broad, suboval, more or less hairy at sides. 7.
 6. Lateral teeth of scutellum short and blunt; tegulae black; length about 9 mm *mæsta*, Cress.
 Lateral teeth of scutellum longer and sharper; tegulae dark reddish; length about 12 mm *Portera*, Ckll.
 7. Apex of ventral plate with a very small projection; apex of dorsal plate curved upwards *Gilensis*, Ckll.
 Apex of ventral plate with a large projection; apex of dorsal plate not curved upwards 8.
 Apex of ventral plate without a projection; apex of dorsal plate not curved upwards *Apacheorum*, Ckll.
 8. Lateral teeth of scutellum long, somewhat curved inwards *grindelia*, Ckll.
 Lateral teeth of scutellum shorter, slender, straight *ribis*, Ckll.

Cælioxys Sayi, Robertson, 1897.Las Cruces, June 12. Resembles *octodentata*, but easily separated by the clypeus.*Cælioxys deplanata*, Cresson, 1878.

Mesilla, June 30; Mesilla Park, October 14.

Cælioxys octodentata, Say, 1824, (*altilis*, Cress.).Santa Fé, July 6, at flowers of *Rudbeckia laciniata*; July 27; Albuquerque; Las Vegas, August 11, taken by Miss S. L. Mize, on

flowers of *Grindelia squarrosa*; West Fork Gila River, taken by Townsend, July 12. A male from flowers of *Aster spinosus* at Mesilla, July 25, is inseparable from males of *octodentata*.

Cælioxys menthæ, Ckll., 1897.

♂. Deming. ♀. Las Cruces, August 11 and August 23, the last at flowers of *Chrysopsis villosa*; both taken by C. H. T. Townsend. The ♀ is about 12 mm. long; the apical plates of the abdomen are of the same general type as those of *octodentata*, but longer, and the dorsal plate does not fall much short of the ventral. The bands of pubescence along the front of the mesothorax, and in the scutello-mesothoracic suture, are of a light warm ochreous colour. The abdominal bands are entire and regular.

Cælioxys rufitarsis, Smith, 1854.

♀. Rio Ruidoso, about 7,500 feet, August 3, at flowers of *Verbena Macdougalii*. This specimen, collected by Townsend, differs from Smith's description by the black nervures, and tegulæ not testaceous in the middle, but it accords herein with *rufitarsis* as understood by Cresson. The tarsi are red. What I regard as the ♂ of this occurred at Las Vegas, July 11, at flowers of *Cleome serrulata*. It is larger than *C. Gilensis*.

Cælioxys mæsta, Cresson, 1864.

Beulah, end of August.

Cælioxys (lucrosa var. ?) *Porteræ*, n. sp.

♀. Harvey's Ranch, near Las Vegas, 9,600 feet, August 22, 1899. (Wilmatte Porter.) Length about 12 mm. Pubescence white; short but rather dense on cheeks; short and mostly appressed on face; abundant on sides of thorax and on metathorax; erect, scanty and inconspicuous on vertex, mesothorax and scutellum; no band on anterior margin of mesothorax, and only a very slight one at scutello-mesothoracic suture; legs, except coxæ, scarcely pubescent, four hind tarsi clothed with fulvous hair on inner side; abdominal bands narrow, not very conspicuous, inclined to be more or less interrupted in the middle; antennæ and mandibles entirely black; tegulæ dark reddish-brown; wings brownish; punctures of vertex, mesothorax and scutellum dense, large and deep, scutellum becoming cancellate; edge of scutellum only gently convex, with no central nodule, lateral teeth moderate, straight; abdomen shining, punctures sparse on greater part of segments 2 to 4; segments 2 and 3 with a transverse groove; ventral surface with distinct,

rather close punctures; penultimate ventral segment minutely roughened with dense punctures of two sizes; apical plates much as in *lucrosa*, but the dorsal plate has the narrowing nearer the base, and its keel is distinct; the ventral plate appears to be rather more produced. Close to *lucrosa* and *mesta*, but probably a distinct species.

Calioxys Gilensis, Ckll., 1898.

Length: ♂, 9-10 mm.; ♀, 11 mm. The discovery of the female shows that this species is very close to *C. modesta*, Smith, but differs in the colour of the legs and the entire abdominal bands. ♀. Gallinas River at La Cueva, at flowers of *Psaralea tenuiflora*, August 6 (Ckll.); Rio Ruidoso, at flowers of *Vicia* aff. *pulchella*, about 6,700 feet, July 29 (Townsend). ♂. Rio Ruidoso, with the ♀s just cited, also at flowers of *Rhus glabra*, about 6,500 feet, July 19 (Townsend); Gila River (Townsend); Santa Fé, July 6 (Ckll.). The males resemble *rufitarsis*, but are uniformly smaller.

Calioxys Apacheorum, n. sp.

Mescalero, July 20 (C. M. Barber). ♀. Somewhat related to *C. alternata*, Say, as interpreted by Cresson. Length 11 mm., narrow, with the shape of *C. Gilensis*; pubescence dull white; face quite densely pubescent; anterior border of mesothorax with the band of pubescence divided behind into three teeth, the lateral ones the most distinct; scutellum with hind edge strongly convex, without a central nodule; lateral teeth long and almost straight; antennæ and mandibles black; legs black, including tarsi; spurs dark ferruginous; punctures of mesothorax and scutellum large and deep; wings strongly suffused with brown; nervures black, stigma ferruginous; tegulæ ferruginous, piceous at base; abdomen shining dorsally, with strong but sparse punctures; abdominal bands regular and entire; additional bands of hair at the sides of the segments, marking the transverse depressions, which, however, entirely fail broadly in the middle of the dorsum; ventral surface strongly and rather closely punctured, the penultimate segment with small punctures interspersed between the large ones; apical dorsal segment ending in a point at an angle of perhaps 80°, the longitudinal keel wanting, or slightly indicated at the tip; apical ventral segment not greatly produced beyond the dorsal, rounded, its margins hairy.

This species is peculiar for the absence of a keel or raised line on the last dorsal segment, and the broad interruption of the transverse grooves on segments 2 and 3. Using these characters, our species of *Calioxys* separate thus:

- A. Keel on last dorsal absent *Apacheorum*.
 B. Keel on last dorsal extending about half the length of the segment ;
 transverse grooves on 2 and 3 entire..... *octodentata*, *Sayi*.
 C. Keel on last dorsal extending about three-quarters the length of the
 segment.
 a. Transverse grooves on 2 and 3 interrupted in middle
 line..... *mæsta*.
 b. Transverse grooves on 2 and 3
 entire..... *deplanata*, *ribis*, *rufitarsis*, *Porteræ*.
 D. Keel on last dorsal extending practically the whole length of the
 segment.
 a. Transverse grooves on 2 and 3 entire..... *grindeliæ*.
 b. Transverse grooves on 2 and 3 broadly interrupted
 dorsally..... *menthae*, *Gilensis*.

Celtioxys grindeliæ, n. sp.

Las Vegas, at flowers of *Grindelia squarrosa*, August 9, both sexes
 (W. Porter); August 11, ♂ (S. L. Mize).

Las Vegas, at flowers of *Solidago Canadensis*, August 11, ♂ (W.
 Porter); Las Vegas Hot Springs.

♀. Length about 11 mm.; pubescence pale with a brownish tinge,
 that along anterior margin of mesothorax (especially at sides) and a spot
 behind tegulae, pale ferruginous; disc of mesothorax and scutellum
 nude; abdominal bands rather broad, entire and conspicuous, no short
 lateral transverse grooves or bands, but transverse grooves crossing the
 dorsum of segments 2 and 3; mandibles externally covered with
 appressed pubescence like the face (this is also the case in *ribis*);
 antennae and tegulae black; legs black, including tarsi; nervures and
 stigma black; wings with the outer margin broadly brown; mesothorax
 cancellate with extremely dense large punctures; lateral teeth of
 scutellum long; abdomen rather sparsely punctured; penultimate
 ventral segment punctured like the others, without the minute punctures
 interspersed; last dorsal segment densely punctured, with a strong
 raised line going as far as the articulating base; apical ventral segment
 longer than dorsal, broad, hairy at sides, with a broad apical pointed
 projection.

♂. Similar to the ♀, except in the usual sexual characters;
 pubescence often whiter than in ♀; end of abdomen with eight teeth,
 those on the fifth segment being well developed.

The punctuation of the penultimate ventral segment in the ♀ is diverse in the different species; thus in *rufitarsis*, *Porteræ* and *Apacheorum* there are numerous small punctures interspersed among the large ones; in *menthae*, *Gilensis* and *grindeliae* the punctures are large, on a shining surface, without little ones interspersed; in *deplanata*, *ribis* and *mæsta* the punctures are small and very dense posteriorly, and larger and well separated on the anterior part of the segment.

Cælixys ribis, n. sp.

Romeroville, April 29, 1899, at flowers of wild gooseberry (Wilmatte Porter). ♀. Length about 11 mm., rather broad, superficially like *C. grindeliae*, but the abdomen tapers more rapidly; the pubescence is white; the hair on the eyes is very long (it is very short in *grindeliae*); the inner orbital margins diverge much more above; the punctures of the mesothorax are sparser in the middle, leaving some shining surface between; the teeth of the scutellum are shorter; the apical projection of the last ventral segment is longer and narrower; the mesothorax is quite hairy, but has no distinct hair-patches; the penultimate ventral segment is dull, roughened with excessively close minute punctures posteriorly, sparsely punctured anteriorly.

SYNOPSIS OF FOOD-HABITS OF THE LARVÆ OF THE SESIIDÆ.

BY WILLIAM BEUTENMÜLLER, NEW YORK.

The larvæ are universally borers, but in the choice of food-plants there is the widest diversity; some bore through and devour solid wood, as do the larvæ of the Cossids; some prefer the pith of woody stems; others are found in the superficial woody layers; still others affect the roots of plants both woody and herbaceous, or are sometimes to be found in the borings made by other insects, as is the case with *Memnythrus tricinctus*, *Sesia pictipes*, *S. scitula*, and others. The larvæ are yellowish or dirty white, beset with only a few short hairs. The head and cervical shield are chestnut brown. They hibernate in various stages of growth, but do not overwinter in the pupal stage, as far as the species of the northern States are concerned. The larvæ of *Melittia satyriniformis* hibernate fully grown in the cocoons. When fully developed they spin elongate oval cocoons composed of chips cemented together by a gummy secretion or silk. The cocoons are formed in the burrows or in contiguous places.

Boring in trees.

Under bark of trunks some distance from the base or in the branches :

| | |
|--|----------------------------|
| Maple..... | <i>Sesia aceris</i> . |
| Maple..... | " <i>corni</i> . |
| Apple, Pear..... | " <i>pyri</i> . |
| Dogwood, Oak, Chestnut | " <i>scitula</i> . |
| Alder..... | " <i>Americana</i> . |
| Cherry, Plum, Juneberry..... | " <i>pictipes</i> . |
| Pine, Redwood (<i>Sequoia</i>) | <i>Vespamima sequoia</i> . |
| Pine and Spruce | <i>Parharmonia pini</i> . |

Under bark at base of trunk or main roots :

| | |
|--|-------------------------------|
| Peach, Cherry, Plum, Apricot, etc..... | <i>Sanninoidea exitiosa</i> . |
| Peach and Cherry..... | " <i>opalescens</i> . |
| Peach, Cherry..... | " <i>Graefii</i> . |

In solid wood of trunks :

| | |
|----------------------------|-----------------------------|
| Ash..... | <i>Podosesia syringæ</i> . |
| Ash..... | " <i>fraxini</i> . |
| Oak | <i>Memythrus simulans</i> . |
| Cottonwood | <i>Egeria pacifica</i> . |
| Cottonwood and Locust..... | <i>Memythrus robinia</i> . |
| Poplar | " <i>Dollii</i> . |
| Willow and Poplar..... | " <i>tricinctus</i> . |
| Willow..... | <i>Sesia Bolteri</i> . |
| Willow..... | " <i>albicornis</i> . |

In solid wood at base of trunks and roots of trees :

| | |
|------------------------|--------------------------------|
| Persimmon..... | <i>Sannina uroceriformis</i> . |
| Willow and Poplar..... | <i>Egeria apiformis</i> . |
| Willow..... | " <i>tibialis</i> . |
| Ash, Alder..... | <i>Memythrus asilipennis</i> . |

Boring in shrubs.

In solid wood :

| | |
|-------------|----------------------------|
| Lilac | <i>Podosesia syringæ</i> . |
|-------------|----------------------------|

In pith of stems :

| | |
|---------------------------|-----------------------------|
| Currant, Gooseberry | <i>Sesia tipuliformis</i> . |
|---------------------------|-----------------------------|

In roots :

| | |
|--------------------------------|-----------------------------|
| Blackberry and Raspberry..... | <i>Sesia rutilans</i> . |
| Blackberry and Raspberry | <i>Bembecia marginata</i> . |
| Sumac..... | <i>Melittia gloriosa</i> . |

Boring in vines and creeping plants.

In the stems :

- Squash, Pumpkin, and other Cucurbs *Melittia satyriniformis*.
 Big-root (*Megarrhiza*) " *gloriosa*.

In roots :

- Grapevine *Memythrus polistiformis*.
 Clematis *Alcathoe caudata*.
 Clematis " *korites*.

Herbaceous perennial plants.

In roots :

- Strawberry *Sesia rutilans*.

In stem :

- Eupatorium* *Sesia lustrans*.

In borings of other insects :

- Oak-gall (*Andricus cornigerus*) *Sesia scitula*.
 Oak-gall (*Andricus cornigerus*) " *rubristigma*.
 Gall on Live Oak " *querci*.
 Gall on Oak " *sapygaformis*.
 Gall on Mesquite " *prosopis*.
 Gall of *Saperda concolor* " *albicornis*.
 Gall of *Saperda concolor* *Memythrus tricinctus*.

NOTES ON COLORADO BEES.

BY E. S. G. TITUS, FORT COLLINS, COLO.

The following table is intended to serve as a means of separating the species of the genus *Agapostemon*, Smith, occurring in Colorado :

Body green or blue-green.

A. Abdomen unicolorous with body.

B. Mesonotum with double punctuation *Texanus*, Cress. ♀.

BB. Mesonotum with confluent punctures, metathorax longitudinally rugose *radiatus*, Say. ♀.

AA. Abdomen differing in colour from body.

B. Abdomen black.

C. Abdomen yellow banded.

D. With five bands.

E. Last ventral segment with a median carina *viridulus*, Fab. ♂.

EE. Last ventral segment without a median carina *Texanus*, Cress. ♂.

- DD. With six bands.....*radiatus*, Say. ♂.
 CC. With white hair-bands.....*viridulus*, Fab. ♀.
 BB. Abdomen honey-yellow.....*melliventris*, Cress. ♀.
 BBB. Abdomen yellow, with very narrow black
 bands.....*melliventris*, Cress. ♂.

The males of *radiatus*, *Texanus* and *viridulus* are hard to satisfactorily separate. That portion of the table relating to them has been formed almost wholly from a study of the excellent paper of Mr. Chas. Robertson, North American Bees, Desc. and Syns.*, in connection with the study of the males in the collection of the Colo. Agr'l College. Specimens of male and female of *radiatus*, *Texanus* and *viridulus* were sent to Mr. Robertson, who kindly looked them over and verified or, where necessary, corrected my determinations.

The following is a list of the specimens now in the College collections :

Agapostemon viridulus, Fab., 1793.

Thirty-five females ; Trinidad, Ft. Collins and Poudre Canon.

Ten males ; Poudre Canon and Ft. Collins.

Taken on *Salix*, *Taraxicum*, *Geranium*, *Opuntia* and several *Cruciferae*.

Agapostemon radiatus, Say, 1837.

Two females, Delta ; two males, Montrose and Salida (Gillette), and one male, Poudre Forks (Laura Armstrong).

Females taken on *Salix*.

Agapostemon Texanus, Cress., 1872.

Seventy-four females ; Greeley, Lamar, Dolores, Trinidad, Ft. Collins and Rist Canon.

Twenty males ; Julesburg (Ball), Greeley, Fort Collins and Rist Canon. This species has been taken on *Malvastrum coccinium*, *Salix*, *Taraxicum*, *Geranium* and *Cnicus*.

Agapostemon melliventris, Cress., 1874.

One female at Delta, Colo., 27-v.-00, on *Salix*, by Prof. Gillette.

There are also in the collection a female taken in Mesilla Valley, N. M., on *Solanum*, and a male from Las Cruces, N. M., on *Solidago*, both from Prof. Cockerell.

Colletes nigrifrons, n. sp. ♀.

Length, 7-8 mm. Black, rather heavy set ; head broad, clypeus

*Trans. Acad. Sc., St. Louis, VII., No. 14, 1897.

prominent, punctures larger than on rest of face, partly confluent ; face covered with short black hair ; labrum with a distinct median depression ; mandibles black, tips rufo-testaceous, notch one-fifth of length from the blunt tip, strongly grooved without, space between eyes and base of mandibles not as great as width of latter ; antennæ short, black, flagellum deep brown beneath, reaching to line of tegulæ ; cheeks sparsely fringed with short, black hair ; dorsum of the thorax with short, sooty hair, some black hair intermixed in spots, disc shiny, sparsely pubescent ; pleura with black hair ; thorax quite evenly sparsely punctured, post-scutellum more finely punctured, base of metathorax with transverse series of pits, triangle shining, not smooth ; tegulæ shining, distinctly piceous ; wings hyaline, nervures and stigma testaceous, marginal cell very dark, second submarginal narrow at top, third not narrowed as much as usual in one specimen ; legs black with sooty pubescence, tarsi reddish with rufo-testaceous hair, first joint very dark ; abdomen black, punctured, first two segments shining, white hair-bands on segments 1-5, on 1 and 2 interrupted, otherwise sparsely pubescent with black hair, venter with very short black hair.

Described from two females : Ft. Collins, Colo., 6-viii.-96 (Gillette), and Horsetooth Mt., Colo., 22-vi.-99, on *Potentilla*. This species differs from known Colorado species by the black hair on the face and pleura and the sooty hair on thorax. Prof. Cockerell writes that it is closely related to *C. pascoensis*, Ckll., from Washington ; but differs by its smaller size and by possessing hair-bands.

I wish to acknowledge the kindness of Prof. Cockerell and Mr. Robertson for favours shown me in revising portions of my manuscript, and for the general help they have given me.

NOTES ON SOME NORTH AMERICAN SPECIES OF TINEIDÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

About the time that Lord Walsingham's valuable paper on *Acrolophus* and *Anaphora* appeared (Trans. Ent. Soc., Lond., 1887, 137-173), Mr. Beutenmüller was working on the same group ; but neither author has since attempted to recognize the species named by the other, so far as I am aware. In Prof. Smith's List Lep. Bor. Amer., 1891, the group is recognized as a family—*Anaphoridæ*—but this can hardly stand. The genera will fall in the *Tineidæ*, in the more restricted sense (see Walsing-

ham, Proc. Zool. Soc., London, 1897, 139-175). The following synopsis of genera is from Walsingham, with addition of two genera described since the original publication :

ANAPHORINÆ.

Palpi erect or slightly recurved.

Veins 8 and 9 of fore wing stalked.

Palpi erect.....*Eulepiste*.

Palpi appressed to head.....*Neolophus*.

Veins 8 and 9 separate.

Antennæ bipectinate.....*Ankistrophorus*.

Antennæ simple or serrate towards apex.

Tarsal joints of hind legs strongly fringed above...*Thysanoskelis*.

Tarsal joints not fringed above.

Palpi erect, with separate tufts on each joint.....*Ortholophus*.

Palpi slightly recurved, uniformly hirsute.....*Pseudanaphora*.

Palpi strongly recurved.

Antennæ bipectinate.....*Felderia*.

Antennæ serrate throughout.

Veins 8 and 9 of fore wings stalked.....*Cænogenes*.

Veins 8 and 9 of fore wings separate.....*Anaphora*.

Antennæ simple, compressed, or slightly serrate at ends.

Veins 7 and 8 of fore wings stalked.....*Atopocera*.

Veins 8 and 9 of fore wings stalked.

Head with an erect crest.....*Urbara*.

Head without an erect crest.....*Hypoclopus*.

No veins of fore wings stalked.

Palpi roughly clothed throughout.

An erect fringe along lower margin of cell on hind

wings.....*Pilanaphora*.

No such erect fringe on hind wings.....*Acrolophus*.

Palpi smooth, the last joint only tufted.....*Stæberhinus*.

Genus EULEPISTE, Walsingham.

Wals., Trans. Am. Ent. Soc., X., 169, 1882; Trans. Ent. Soc., Lond., 1887, 142.

Synopsis of Species.

Uncus single, the opposing lower limb not half as long as the upper limb.

Harpes concave, rounded at the ends.....*Cressoni*.

Harpes concave, obliquely truncate above.....*maculifer*.

Uncus single, its opposing lower limb nearly as long as the upper and stouter.

Harpes nearly flat, the ends bent inward, rounded. *Cockerelli*.

Eulepiste Cockerelli, n. sp.

Palpi upturned in front of the head, free, as high as the vertex ; male antennæ simple, slightly serrated toward the ends ; veins 8 and 9 of fore wing stalked ; thorax and fore wings dark brown-gray, somewhat grizzled or mottled with darker and with an obscure darker spot at the end of the cell. Hind wings dark brown ; abdomen gray-brown ; expanse 16 mm. One male, Mesilla Park, New Mexico, at light, July 8th (T. D. A. Cockerell) ; U. S. Nat. Mus., Type No. 4417.

Genus *HYPOCLOPUS*, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 141.

Synopsis of Species.

Uncus single, down curved, broad at base, tip pointed ; harpes broad, narrow at base, squarely truncate. *griseus*.

Uncus double, the two points separate, sharply down curved, the ends bent outward, enlarged and rounded ; harpes long, narrow and uniform. *mortipennellus*.

Hypoclopus griseus, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 144.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley) ; San Diego, Texas, May 9 (E. A. Schwarz) ; Oracle, Arizona, June 28 (E. A. Schwarz) ; Brownsville, Texas, Apr. 27 (C. H. T. Townsend) ; Washington, D. C., July 20 (A. Busck).

The Texas specimens are pale, the ground colour an ashy white, on which the dark specks and streaks show plainly. The specimen from Oracle, Ariz., is very dark, the black markings predominating.

Hypoclopus mortipennellus, Grote.

Grote, CAN. ENT., IV., 137, 1872 ; XVIII., 199, 1886. Wals., Trans. Am. Ent. Soc., X., 167, 1882 ; Trans. Ent. Soc., Lond., 1887, 150 ; *quadripunctellus*, Beut. (ined.), Smith's List Lep. Bor. Amer., No. 5057, 1891.

This species, described as *Anaphora* and placed by Lord Walsingham in *Acrolophus*, may be removed to *Hypoclopus*, as a majority of the specimens have veins 7 and 8 of fore wings stalked, at least on one side. Of twelve specimens before me, seven have these veins stalked on

Florida (coll. Beutenmüller, type of *angustipenellus*); Georgia (coll. Beutenmüller); Orange Co., Florida (coll. Beutenmüller); Texas (Boll. coll. C. V. Riley, identified by Walsingham); Columbus, Texas, June (E. A. Schwarz).

Acrolophus violaceellus, Beutenmüller.

Beut., Ent. Amer., III., 139, 1887.

The genitalia are not very different from those of *Arizonellus*, Wals., though the harpes may be somewhat slenderer. However, the moth differs in its uniform, unspotted, purplish colour.

North Carolina (Beutenmüller's types); Iowa (from Dept. Agriculture).

Acrolophus Arizonellus, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 153.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley); Mesilla, New Mexico, June 25 and July 1 (T. D. A. Cockerell); Tucson, Arizona, July 19, 20 and 21 (E. A. Schwarz).

Genus ANAPHORA, Clemens.

Clem., Proc. Ac. Nat. Sci., Phil., 1859, 261; Wals., Trans. Ent. Soc., Lond., 1887, 155.

Anaphora popeanella, Clemens.

Clem., Proc. Ac. Nat. Sci., Phil., 1859, 261; Wals., Trans. Ent. Soc., Lond., 1887, 161 (references and synonymy); Riley, Smith's List Lep. Bor. Am., No. 5061, 1891; *confusellus*, Beut. (ined.), Smith's List Lep. Bor. Am., No. 5056, 1891.

The form *confusellus* is smaller than the usual form, the ground colour lighter and more purplish, the dark marks strongly relieved. In genitalia there is no marked difference. The form differs from *popeanella* about as much as *Acrolophus cervinus*, Wals., does from *A. plumifrontellus*, Clem. U. S. Nat. Mus., type No. 405.

Georgia (Beutenmüller's type); Kirkwood, Missouri? (labelled only "148 M," i. e., Murtfeldt); Georgia (A. Oemler, labelled "Anaphora, n. sp., Wlsm., '86"); Georgia (labelled "Anaphora, n. sp., doubtless = *plumifrontellus*, C. V. R., '86, with Wlsm."); eight specimens, badly worn (labelled only "667, Aug., '80, coll. C. V. Riley").

Genus FELDERIA, Walsingham.

Wals. Trans. Ent. Soc., Lond., 1887, 165.

Felderia filicornis, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 165; *Mexicanellus*, Beut., Ent. Amer., IV., 29, 1888.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley); City of Mexico (Beutenmüller's type of *Mexicanellus*); Oracle, Arizona, July 12 (E. A. Schwarz); Fort Grant, Arizona, July 20 (H. G. Hubbard); Brownsville, Texas, June 10 (C. H. T. Townsend).

Genus ORTHOLOPHUS, Walsingham.

Ortholophus variabilis, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 169.

Arizona (Morrison, from Lord Walsingham, through C. V. Riley); Arizona (coll. Beutenmüller); Arizona (yellow labels 5, 7 and 8 marked "prob. undescribed," Wism., 1886); Oracle, Arizona, July 8, 10, 12, 16 and 24 (E. A. Schwarz); Fort Grant, Arizona, July 19, 20 and 22 (H. G. Hubbard); Tucson, Arizona, July 21 (E. A. Schwarz); Chiricahua Mts., Arizona, July 4 (H. G. Hubbard); Mesilla Park, New Mexico, July 8 and Aug. 13 (T. D. A. Cockerell); Texas (coll. Beutenmüller); Sharpsburg, Texas, May 11 (E. A. Schwarz); Glenwood Springs, Colorado (W. Barnes); Nevada.

Genus PSEUDANAPHORA, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, 170; *Eutheca*, Grote, Bull. Geog. Surv. Terr., VI., 257, 1881; Dyar, CAN. ENT., XXVII., 15, 1895; *Sapinella*, Kirby, Cat. Lep. Het., 524, 1892.

Synopsis of Species.

Uncus single, long and slender.....*Davisellus*.

Uncus double, two spines projecting from a rounded plate....*arcanella*.

Pseudanaphora Davisellus, Beutenmüller.

Beut., Ent. Amer., III., 139, 1887.

Though described as an Acrolophus, this is obviously referable to Pseudanaphora, from the short erect palpi.

Arizona (Beutenmüller's type); Fort Grant, Arizona, July 20 (H. G. Hubbard).

Pseudanaphora arcanella, Clemens.

Clem., Proc. Acad. Nat. Sci., Phil., 1859, 262; Wals., Trans. Ent. Soc., Lond., 1887, 170 (references); Beut., Ent. Amer., IV., 29, 1888; Forbes, 16th Rept., Ill., 98, 1890; *mora*, Grote, Bull. U. S. Geol. Surv., VI., 257, 1881; Kirby, Cat. Lep. Het., 524, 1892; Dyar, CAN. ENT., XXVII., 15, 1895.

Rhinebeck, New York (Dyar); Rhinebeck, N. Y., July 5 (Miss L. J. Hoff); Fordham, N. Y. (G. Gade); Staten Island, N. Y., June 25 and July 16 (coll. Beutenmüller); District of Columbia, July 18 (coll. C. V. Riley); Washington, D. C., October 10 (A. Busck); St. Louis, Missouri, issued July 3 (C. V. Riley, breeding No. 2563); Texas (coll. Beutenmüller). The specimen taken in October is very dark in colour, blackish, the markings being only faintly indicated.

NEW COCCIDÆ FROM CALIFORNIA.

BY EDW. M. EHRHORN, MOUNTAIN VIEW, CAL.

Xylococcus quercus, n. sp. (Plate 7, figs. 1 and 2.)

Egg quite large, of a light orange colour.

Young larvæ dark orange-red, active, body broadly oval, about $\frac{2}{3}$ mm. long. Legs and antennæ light brown, well developed. Antennæ short, 6-jointed. Joint 1 stoutest, joint 6 longest, and joint 4 shortest. Formula: 651234. Joints 2 and 5 with three bristles. Joint 6 with numerous long stout bristles. Legs moderately long, with femur quite swollen. Tarsus longer than tibia. Digitules of tarsus fine hairs; those of claw long stout clubs curved upwards. Each segment of abdomen bears a backward directed short stout spine. On each side of anal tube is a long fine bristle. Anal tube large, with numerous stout spines. Stigmatal tubes well developed.

♀ second stage, body crimson, shiny, nearly spherical, about $1\frac{1}{2}$ mm. long, 1 mm. broad, surrounded by cottony and waxy secretion. Antennæ and legs wanting. Anal tube well developed, producing a glassy rod, like a stout white hair, rather brittle. Last segment of body dark brown. When cleared in K. H. O., surface of body finely granulated, more so near caudal end. Stigmatal tubes are large and well defined. There are numerous spines and gland openings scattered over the body.

♀ third and fourth stages very similar to second stage, but larger in each case from the preceding, and varying in the further development of stigmatal and anal tubes, glands, spines, etc.

Adult ♀ head, thorax, legs and antennæ reddish-brown, abdomen blackish-brown, segmentation distinct. There is a distinct constriction between the thorax and abdomen. Length of body about $5\frac{1}{2}$ mm., breadth $2\frac{1}{2}$ mm., quite convex above. Ventral side of abdomen concave, with revolute margins. Insect quite active. When ready to

deposit eggs crawls into some crevice and produces a cottony cushion on which it rests and secretes considerable white cotton over its entire body. Antennæ 9-jointed. Joint 1 longest and broadest, next in length is 2, then joint 9 and then 3. Joints 4, 5, 6, 7 and 8 are subequal, and are a little shorter than 3. Formula: 129345678. Legs long and stout. Tibia twice as long as tarsus, both very hairy. Claw long and stout. Digitules fine hairs. Body sparsely covered with long stout spines, especially along the margin and caudal end. Stigmatal tubes very prominent. Anal opening simple and quite large.

♂ larva much like that of ♀, but narrower and more oblong.

♂ second stage not observed.

♂ third stage like that of ♀, but smaller and more elongated.

♂ fourth stage (cast skin) without rostrum. Antennæ 9-jointed. Joints 1 and 9 longest and subequal; joints 7 and 8 subequal; joints 4 and 6 subequal; and joints 2 and 5 subequal. Each joint with long stout hairs. Joint 9 rounded at tip, with several stout hairs and spines. Formula: (19)(78)3(46)(25). Legs long and very stout. Femur much swollen, very little shorter than tibia. Tarsus $\frac{1}{2}$ of tibia. Claw stout and curved. Digitules simple hairs. Body covered with long fine hairs. There are several stout spines on caudal end of abdomen.

♂ pupa, about $2\frac{1}{2}$ mm. long and 1 mm. broad, enveloped in a densely-woven cottony sac about 5 mm. long and 2 mm. broad. Thorax, legs and antennæ light yellow, abdomen crimson. Wing-pads very broad. Legs long and stout. Tarsus $\frac{1}{2}$ as long as tibia. Femur stout and as long as tibia. No claw. Antennæ 9-jointed. Joint 1 stoutest. All joints annulated with white and subequal. Formula: 3.(2.9)4.5.6.7(18).

Adult ♂ about 3 mm. long and $1\frac{1}{2}$ mm. broad, slightly pubescent. Colour of abdomen reddish-brown. Mesothorax black, with four raised knobs. Front part of head black, eyes very prominent, strongly faceted, black. Legs and antennæ black and very hairy. Ventral surface of abdomen dark brown, segmentation distinct. Mesosternum black, a small black line on prosternum, and an irregular black patch on metasternum. Abdominal brushes with long stout glassy bristles about 6 mm. long. Style short, stout and conical. Antennæ 10-jointed, very hairy, reaching beyond end of abdomen. Joint 2 shortest, joints 3 and 10 a little longer, and the other joints subequal. Each joint with numerous hairs. Wings large, about 3 mm. long and 1 mm. broad, expanse about

7 mm., smoky, slightly pubescent, with the costal space blackish-brown. Halteres resembling small wings with several hooks. Legs long, stout and very hairy. Femur much shorter than tibia. Tibia about four times as long as tarsus. Digitules fine hairs. Claw long, slender and well curved. Digitules short club-shaped hairs.

Hab.—I found this remarkable insect in May, 1899, on *Quercus chrysolepis* in Stevens Creek Canon, near Mountain View, Cal., and patiently collected the different stages during the year.

Phenacoccus artemisiae, n. sp. (Plate 7, fig. 3.)

Adult ♀ elongate oval, about 3 mm. long and $1\frac{1}{2}$ mm. broad, of a sage-green colour. Measuring with egg sac $4\frac{1}{2}$ mm. Sac loosely woven without any grooves, eggs lemon-yellow. Legs and antennæ light brown. Body thinly covered with secretion, but not enough to hide colour of body. Segmentation distinct. When placed in boiling K. H. O., body turns orange colour, and leaves derm colourless after boiling. Antennæ 9-jointed. Joint 2 always longest, joints 5, 6, 7, 8 subequal. Formula: 23914(5678). Joints 1, 7, 8 and 9 with several stout hairs. Legs short and stout. Femur about as long as tibia. Tibia twice as long as tarsus. Claw stout and long, with tooth. Digitules fine knobbed hairs.

Adult ♂.—Abdomen yellowish-green, thorax and head dark green. Thorax marked with black longitudinal lines. Body slightly pruinose. Antennæ and legs light brown. Eyes dark red. Wings more or less pruinose, very delicate. Antennæ very hairy; 10-jointed. Joint 3 longest, joint 1 shortest and stoutest, joints 7, 8 and 10 subequal, joints 2 and 9 subequal. Formula: 3.4 5.6.(7.8.10)(2.9)1. Legs very hairy, long and slender. Tibia much longer than femur. Tarsus very short, less than $\frac{1}{3}$ of tibia. Claw long and very slender. Digitules fine hairs.

Hab.—On *Artemisia Californica*. Stevens Creek Canon, near Mountain View, Cal. August 22, 1899.

Phenacoccus stachyos, n. sp. (Plate 7, fig. 4.)

Adult ♀ about $2\frac{1}{2}$ mm. long and 1 mm. broad, convex, tapering posteriorly, viviparous, of a sage-green colour. Slightly covered with white secretion, which, when seen through lens, appears as minute white dots. Segmentation distinct. There are two longitudinal rows of light brown dots on the meson. The dorsum and margin are thickly set with long fine iridescent spines, which are deciduous. Legs and antennæ light brown, quite hairy. Caudal filaments short and stout. When placed in

boiling K. H. O., body turns reddish-brown. After boiling, derm becomes colourless, antennæ, mouth-parts and legs remaining light brown. Antennæ long and slender, each joint with a few long fine hairs. Joint 3 longest, next comes joint 2, joints 4 and 5 subequal, joints 1 and 6 subequal, joint 8 shortest. Formula, approximately: 32(45)9(16)78. Legs long and stout, quite hairy. Trochanter with very long bristle. Femur a trifle shorter than tibia. Tarsus about $\frac{1}{3}$ of tibia. Claw long and slender, with tooth. Digitules fine knobbed hairs. Lobes well developed, with a long seta, and two long fine bristles. Anal ring with six stout hairs. On each segment of the ventral surface, thorax, and on the head, there are numerous very long fine hairs, and there are numerous short fine spines and numerous spinnerets with club-shaped tubes scattered over the body. Newly-hatched larvæ orange colour, elongate oval. Antennæ 6-jointed, quite stout. Joint 6 longest, twice as long as 4 + 5; joints 1 and 2 subequal, joints 4 and 5 subequal. Formula: 63(12)(45). Legs short and stout. Tarsus as long as tibia. Rostral loup extending beyond last coxæ. Caudal lobes and setæ quite prominent.

Hab.—On *Stachys bullata*. San Francisquito Canon, near Mayfield, Cal. June 28, 1899.

Phenacoccus bahiæ, n. sp. (Plate 7, fig. 5.)

Adult ♀ about 4 mm. long and 3 mm. broad, covered with white cottony secretion, with a distinct ridge of cottony tufts running longitudinally on the meson and two smaller ridges parallel with it. Each ridge has a large tuft at the cephalic end. Margin fringed with short broad cottony appendages, getting longer towards caudal end. Legs and antennæ dark brown. Colour of body is greenish-yellow, with a brown patch on the meson. When boiled in K. H. O., turns crimson at first, then derm becomes colourless, except a row of dark brown patches on the body near and running parallel with the margin. These grow larger caudad. Body is densely covered with round glands and stout conical spines. Anal ring large, with six long stout hairs and numerous stout hairs scattered over area surrounding it. Antennæ and legs remain brown. Antennæ 9-jointed, long and stout. Joint 3 generally longest, then 5, then 9. Joints 1, 2 and 8 generally shortest. All joints quite hairy, and joint 9 quite pointed, with numerous hairs. Formula, approximately: 3.5.9.6.7.4.8.1.2. Legs very long, stout, and thickly covered with very stout hairs. Femur and tibia subequal. Tarsus about

$\frac{1}{3}$ tibia. Claw very stout and curved, with tooth. Digitules very long fine hairs.

Immature ♂ much like ♀, smaller and lighter colour, about $2\frac{1}{2}$ mm. long, $1\frac{1}{2}$ mm. broad. Legs not as stout. Antennæ 7-jointed. Formula: 372(1456).

Sac of ♂ snow white, more or less irregular in shape, no distinct carinæ, about 4 mm. long, 2 mm. broad.

Pupa.—When removed from sac, cylindrical, shiny. Outline of antennæ, wing-pads and segmentation distinct. Body more or less pitted. Colour greenish-brown, about $2\frac{1}{2}$ mm. long, $1\frac{1}{2}$ mm. broad. Turns dark red when placed in K. H. O.

Adult ♂ measuring, without setæ, about 3 mm. long and 1 mm. broad. Setæ are about twice as long as body, of a snow-white colour. Head and thorax dark brown, abdomen greenish-yellow, slightly covered with white secretion. Head and thorax with numerous stout hairs, abdomen thickly covered with stout hairs. Antennæ very long, stout and very bristly, 10-jointed. Joint 2 shortest, very little shorter than 1. These two joints are about as broad as long, the rest of the joints are sausage-shaped. Joints 3, 4 and 5 subequal and longest. Formula: (3.4.5)6.7.8.9.10.1.2. Legs very long and stout and very hairy. Coxa and trochanter short, latter with very long stout spine. Femur one-fifth shorter than tibia, tarsus $\frac{1}{2}$ of femur. Claw stout, curved, with tooth and double spur. Digitules stout hairs extending as far as tooth. Tarsal digitules fine hairs extending to end of claw. Wings dusky, pubescent, each about $2\frac{1}{2}$ mm. long by 1 mm. broad. Halteres comparatively small, with two stout, well-curved hooks. Style long, stout and conical, forming a blunt hook at caudal end. The last abdominal segment has two groups of round gland openings; on the cephalic margin of each two very long stout spines arise, which run parallel caudad. There are also numerous stout hairs surrounding the glands.

Hab.—On *Bahia*, sp., in foothills near Mayfield, Santa Clara County, Cal. May 7th, 1899.

Dactylopius quercus, n. sp. (Plate 7, fig. 6.)

♀ slightly covered with white secretion, about $2\frac{1}{2}$ mm. long and $1\frac{1}{2}$ mm. broad, tapering at both ends. Colour of body greenish-brown, concealed more or less by secretion. Segmentation very distinct. Each segment bears a white filament on the margin. Caudal setæ about $\frac{1}{3}$ as long as body, white and quite stout. Antennæ and legs dark brown.

When placed in boiling K. H. O., body turns crimson, derm becomes colourless after boiling. Antennæ 8-jointed. Joint 8 longest, joint 7 generally shortest. Formula, approximately: 832(15)647. Each joint has a ring of stout hairs. Joint 8 has numerous very long hairs. Legs long and stout, with numerous long fine hairs. Femur about as long as tibia; tarsus about a third as long as tibia; claw slender and well curved. Digitules long fine knobbed hairs. Anal ring small, with six fine hairs. Caudal lobes well developed, with very long setæ (280 μ). Groups of spinnerets, conical spines and long slender hairs scattered over the dorsum.

Hab.—On *Quercus chrysolepis*, on the leaves and in cracks of bark. May, 1899. Stevens Creek Canon, near Mountain View, Cal.

Dactylopius maritimus, n. sp. (Plate 7, fig. 7.)

♀ elongate oval, about 2 mm. long and 1 mm. broad, flattish, slightly covered with secretion. Colour of body, reddish-brown. Margin beset with stout, short, white filaments, which grow longer caudad. Caudal setæ about $\frac{1}{2}$ length of body. Legs and antennæ same colour as body. Eggs orange-yellow. Egg sac well developed and has the appearance of *Pulvinaria camellicola*, but smaller—about 5 mm. long and 2 mm. broad.

Young larvæ light orange-yellow.

When boiled in K. H. O., ♀ turns liquid purple and derm becomes colourless. Body thickly beset with long slender spines and many round glands. Each segment has a group of spinnerets on its margin, in the centre of which are two short stout conical spines. Antennæ 8-jointed, quite hairy. Joint 8 always longest, and joint 4 generally shortest, although joint 6 sometimes is shorter than 4; again, joints 4 and 6 are sometimes equal.

The following formulæ will assist in determining the species:

82(13)(57)64.

82(13)5(47)6.

8321(57)64.

81(23)57(46).

Legs quite hairy, well developed, long and slender. Trochanter with long stout spine (128 μ). Femur about as long as tibia. Tarsus about a third as long as tibia. Claw short and stout. Digitules fine knobbed hairs. Caudal lobes prominent, with moderately long setæ and two very stout conical spines. Anal ring large, with 6 very long stout hairs.

Hab.—On *Eriogonum latifolium* roots on the cliffs at Santa Cruz, Cal. July, 1899.

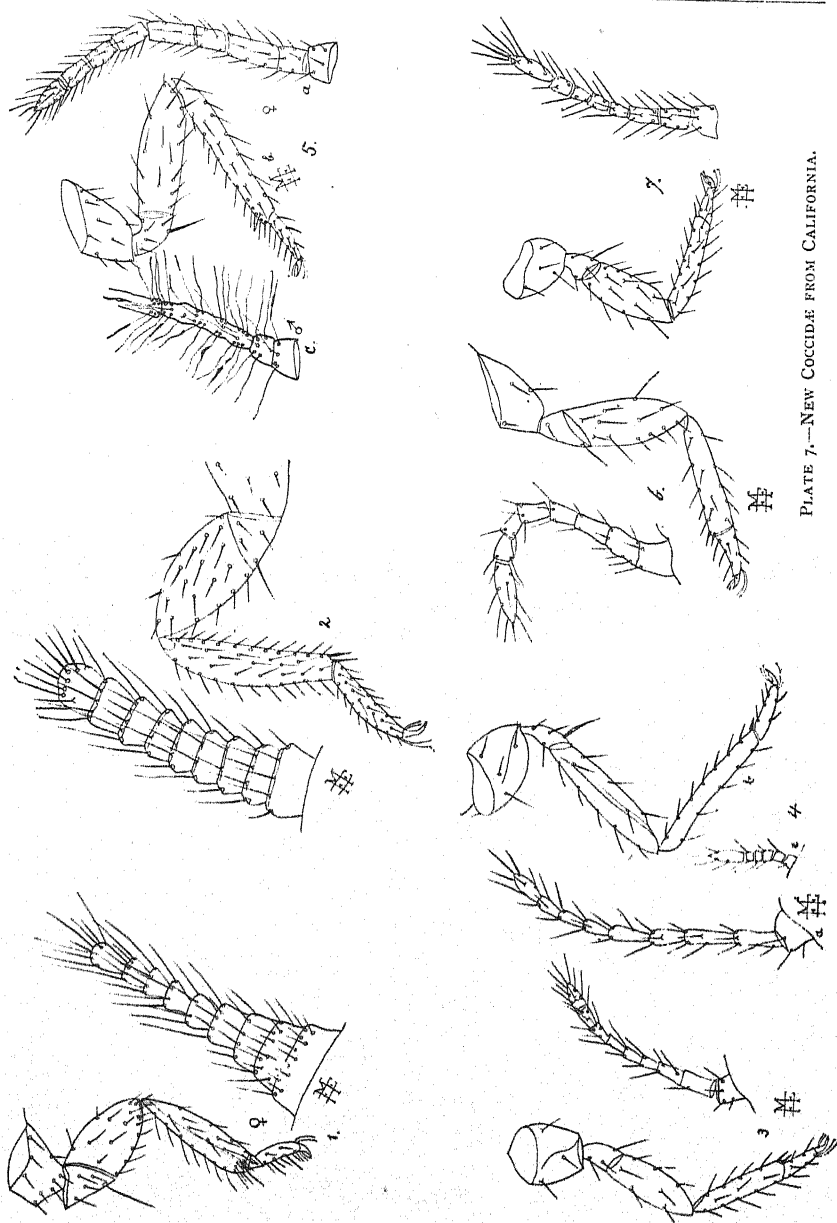


PLATE 7.—NEW COCCIDAE FROM CALIFORNIA.

EXPLANATION OF PLATE 7.

- Fig. 1.—*Xylococcus quercus*: adult ♀ antenna and leg.
 Fig. 2.—*Xylo. quercus*: ♂ fourth stage antenna and leg.
 Fig. 3.—*Phenacoccus artemisiae*: adult ♀ antenna and leg.
 Fig. 4.—*P. stachyos*: a, antenna; b, leg of adult ♀; c, antenna of larva.
 Fig. 5.—*P. bahiae*: a, antenna; b, leg of adult ♀; c, first 3 joints of antenna of ♂.
 Fig. 6.—*Dactylopius quercus*: adult ♀ antenna and leg.
 Fig. 7.—*D. maritimus*: adult ♀ antenna and leg.

A QUESTION OF NOMENCLATURE.

The status of Professor French's *Gastrophilus epilepsalis*, described in the September number of this journal, has interested me especially, as I am preparing a new catalogue of North American Diptera.

I am convinced that it was decidedly premature to assign a specific name to this larva. In the first place, it was very small and immature, and the earlier larval forms of Oestridæ are much less known than the later, so that we do not possess the data that would enable us to separate this species, for instance, from *G. nasalis*. In fact, I do not think Professor French's description sufficient for the recognition of the same stage of the larva at all, unless the specimens were known to have come from a person affected with epilepsy. It must be remembered that there is every reason to assume the normal habitat of this species of fly to be in some other mammal. Its occurrence in man is in the highest degree unusual. Is it not hopeless, then, to anticipate that specimens taken from their normal host at some future time will be correctly associated with this species? And if such a thing could be, would there not be an incongruity in the name *epilepsalis*?

The name does not deserve a place in a catalogue, unless in a footnote.

J. M. ALDRICH.

Moscow, Ida., September 6.

SUDDEN DISAPPEARANCE OF THE PURSLANE SAWFLY, SCHIZOCERUS ZABRISKEI.

BY F. M. WEBSTER, WOOSTER, OHIO.

On page 54 of the current volume of the CANADIAN ENTOMOLOGIST, I called attention to the sudden and almost total disappearance of this

species at Wooster, Ohio, where it had for several years been excessively abundant, even up to the latter part of August and early September of last year, 1899. This abrupt termination of the period of activity was at the time attributed to the effect of a parasitic species, *Ichneutes*, sp. ?, which had in the meantime become also excessively abundant.

Although the purslane has grown luxuriantly and is unusually abundant this year, so much so that gardeners are complaining bitterly of its abundance and vigour, up to September but a single female *Schizocerus* has been observed, and but a single instance of the work of the larvæ noted, though the writer has searched most carefully for both during the entire season. In fact, it was hoped this year that the full life-history of the species might be carefully gone over again and completely studied, but this has unexpectedly been rendered impossible.

BOOK NOTICE.

THE ARGYNNIDS OF NORTH AMERICA.—To Mr. Arthur J. Snyder we are indebted for a paper published in the Occasional Memoirs of the Chicago Entomological Society, Vol. I., No. 1, 1900, on the much-vexed question of the Argynnis of North America.

The author follows Doubleday, Westwood, Edwards, Elwes and others in rejecting the division of the group, made by some systematists, into the two genera, Argynnis and Brenthis, as he considers this division based on "hair-splitting distinctions." In referring to the range of the genus, he is not quite correct in saying that the group is wholly unrepresented in the tropics, as one species, *A. Hanningtoni*, was collected near Mount Kilimanjaro, in tropical Africa, by the lamented Bishop Hannington, and was dedicated to his memory by Mr. Elwes.

The author states that he "has on several occasions taken the sexes of different species *in coitu*, and from personal observations satisfied himself that the Argynnis are polygamous in their habits," and a little further down he says, "*Artonis* and *Eurynome* cohabit, also *Eurynome* and *Clio*. The same is undoubtedly true of several other species."

Surely this is a railing accusation to bring against these unfortunate creatures who have never had it explained to them that they are really different species and should behave as such, and certainly shows a sublime faith in the infallibility of the authors who have named these forms as distinct to which the reviewer, possibly because he was born on St. Thomas's day, has never been able to attain.

Probably the facts which Mr. Snyder has observed would suggest to most field naturalists that these slightly differing forms were really only varieties of one species rather than that this particular group of butterflies had lost all sense of decency and propriety, which would be especially shocking in view of one of their number having been named after a bishop, and apparently our author was led to this conclusion in regard to some, at least, of the supposed libertines, as will presently appear.

Mr. Snyder states his opinion that dimorphism occurs among the Argynnis, and believes "that at least two of our so-called species are in reality dimorphic males of species previously described," but he does not give the names of these species, which are all males.

The author thinks that a thorough exploration of the territories where these disputed forms occur will result in revelations that will startle those who have hastily named new species, but is it not a counsel of perfection to urge the student of Argynnis "to secure a large series of species from every locality," for is not every few miles in every direction a separate locality?

Mr. Snyder reduces the number of supposed species from 64 to 57, and increases the number of supposed varieties from 10 to 15, but the only names which he strikes out of the list are *Macaria*, which he states is a synonym of *Eurynome*, and *Opis*, as a synonym of *Clio*.

Cipris and *Alcestis* are placed as varieties of *Aphrodite* and *Bischoffi*; *Artonis* and *Clio* are finally referred as forms of *Eurynome*.

Arge is listed as distinct, but is said to intergrade with *Eurynome*.

Electa is erroneously given as *Electra*.

Mr. Snyder groups the forms in six groups, which he designates as follows:

Diana group, *Monticola* group, *Edwardsii* group, *Semiramis* group, *Eurynome* group, and *Myrina* group, the latter embracing all those which have been placed in the genus *Brenthis*, along with *Astarte*, *Doub.*-*Hew.*

This grouping is followed by notes on the individual forms, but the whole paper shows that much more knowledge is needed before a really satisfactory revision of the very difficult North American forms can be made.

H. H. L.

The Canadian Entomologist.

VOL. XXXII.

LONDON, NOVEMBER, 1900.

No. 11

CONTENTS.

| | | | |
|--|-----|---|---------------|
| Gibson—Life-history of <i>Euprepia Caja</i> | 321 | Dyar—Change of preoccupied names..... | 347 |
| Dyar—New species of <i>Anaphorinæ</i> | 326 | Ehrmann—Variations in some common species of Butterflies..... | 348 |
| Scudder—New or little known Californian Orthoptera..... | 329 | Ashmead—New genus in <i>Aphelininæ</i> | 349 |
| Smith—Species of <i>Acronycta</i> in the British Museum..... | 333 | Snyder—Argynnis of N. America..... | 350 |
| Ball—Additions to Jassid Fauna..... | 337 | Book Notice—Tutt's British Lepidoptera..... | 351 |
| | | Notes..... | 328, 347, 352 |

THE LIFE-HISTORY OF *EUPREPIA CAJA*, L., VAR. *AMERICANA*, HARR.

BY ARTHUR GIBSON, ASSISTANT, DIVISION OF ENTOMOLOGY, CENTRAL EXPERIMENTAL FARM, OTTAWA.

On the evening of the 31st July, 1899, while collecting moths at the electric light, close to the entrance to the Central Experimental Farm, I was fortunate enough to secure a female of *Euprepia Caja*, L., var. *Americana*, Harr. I enclosed her alive in a small box over night, and by the morning she had laid nine eggs. From these eggs five larvæ hatched, and as I have succeeded in bringing two of these through all their stages, my notes may be of interest to some of the readers of the CANADIAN ENTOMOLOGIST.

Egg.—Semi-ovoid, about .75 mm. in width, at widest part; pale yellowish, smooth, shiny.

On the 9th Aug. one egg hatched, on the 10th two more hatched, and by the morning of the 11th the last two had emerged. Before hatching, the black heads of the young larvæ are plainly noticeable, and the egg at this time is a thick milky colour.

Stage I.—Length at rest 2.25 mm., extended 3 mm. General colour creamy white. Head .4 mm. wide, jet black, shiny, rather depressed at apex. Face sparsely covered with minute hairs. On each segment is a transverse row of black tubercles bearing long hairs, those from tubercles on dorsum being black, while those from tubercles on sides are silvery. On 2nd segment in centre of dorsum is one conspicuous black double tubercle almost extending across the dorsum. Thoracic feet black, pro-

legs concolorous, rather translucent. Young larvæ are very active and spin a slight web.

On the 14th Aug. two larvæ passed the first moult, two more on the 15th, and the last one on the 17th Aug.

Stage II.—Length at rest 3 mm., extended 4 mm. General colour dirty whitish-yellow. Head .5 mm. wide, jet black, shiny, very slightly depressed at apex. Face sparsely covered with hairs, which are a little longer than in last moult. On each segment is a transverse row of shiny black tubercles bearing long black and silvery hairs. The large black double tubercle on 2nd segment in centre of dorsum appears as before. Thoracic feet blackish-gray, prolegs slightly darker than body and rather translucent.

On the 19th Aug. one larva passed the 2nd moult, two more on the 20th, and the 4th on the 21st, one larva having died on the 18th Aug.

Stage III.—Length at rest 5.75 mm., extended 6.5 mm. General colour blackish-gray, with a whitish stripe on dorsum, within which is a central ruddy yellowish-red line. Head .7 to .8 mm. wide, jet black, shiny, slightly depressed at apex. A transverse row of irregular shiny jet black tubercles appear on each segment as before, bearing long blackish and silvery hairs. Large double tubercle on 2nd segment in centre of dorsum also as before. On sides of body a stigmatal band occurs, yellowish-white in colour, with a reddish reflection. Thoracic feet shiny, jet black, prolegs concolorous.

On the 24th Aug. three larvæ passed the 3rd moult, and the remaining one on the 25th Aug.

Stage IV.—Length at rest 9 mm., extended 10.5 mm. General colour black, with the front segments rusty. Head 1.0 to 1.1 mm. wide, jet black, shiny, slightly depressed at apex. Transverse row of shiny jet black tubercles on all segments but head; on the 2nd, 3rd, 4th and 5th segments reddish hairs from all tubercles, and also some rather long blackish and silvery hairs. The hairs on the other segments are all blackish and silvery, some much longer than others. Dorsal band, and yellowish-red line centering dorsal band, have entirely disappeared. Stigmatal band interrupted, whitish, tinted with yellow, very faint. Thoracic feet shiny jet black, prolegs black, tipped with dull red.

On the 29th Aug. three larvæ passed the 4th moult, and the remaining one on the 30th Aug.

Stage V.—Length at rest 15.5 mm., extended 18 mm. General

colour black, with front segments rusty, slightly brighter than in last moult. Head 1.5 to 1.6 mm. wide, jet black, shiny, slight furrow on vertex. Transverse row of shiny black tubercles on all segments but head. On the 2nd, 3rd, 4th and 5th segments, as in last moult, reddish hairs from all tubercles, also some black and long silvery hairs. The hairs from tubercles on the other segments are all blackish and silvery, the silvery ones being long and slender; all the tubercles on dorsal area, including a series of which there is one tubercle posterior to each spiracle, have a pearly white patch at summit. This is most conspicuous on the lateral series—*i.e.*, the third from the dorsum. Thoracic feet jet black, prolegs black, tipped with rusty red.

On the 3rd Sept. two larvæ were swollen, and by the morning of the 4th had passed the 5th moult. The remaining two moulted, one on the 5th, and the other on the 6th Sept.

Stage VI.—Length at rest 24 mm., extended 26.5 mm. General appearance a black hairy caterpillar, reddish rust colour on 2nd, 3rd and 4th segments. Head 1.9 to 2.1 mm. wide, jet black, shiny, slight furrow on vertex. Long sweeping silvery white hairs from all tubercles, particularly numerous on segments 5 to 13, inclusive. These segments also bear short white bristles. On segments 2, 3 and 4 the bristles are a rusty red, with only one (or two) long sweeping whitish hair from each tubercle (these rusty red bristles giving the front part of larvæ the reddish appearance). On segment 5 the lateral tubercles also bear a few rusty bristles. All bristles below stigmata on each side fawn coloured (in some specimens almost white). Dorsal series of tubercles black, on segments 5 to 13, inclusive, lateral and stigmatal tubercles whitish. Stigmata white and very small. On segments 2, 3 and 4 the dorsal tubercles are whitish. Thoracic feet and prolegs concolorous, prolegs tipped with a faint rusty tinge.

On the 18th Sept. two had passed the 6th moult, one having died after the 5th moult. The remaining one moulted on the morning of the 20th, but died the same day.

Stage VII.—Length at rest 32 mm., extended 39 mm. General appearance a black caterpillar with rusty red sides, and covered with long sweeping silvery hairs. Head 3.2 to 3.4 mm. wide, jet black, shiny, bilobed. Face sparsely covered with bristles, those about the mouth-parts short and rusty in colour, those from upper part of face fewer and twice as long, and black in colour. On each side of face, on either side

of apex of frontal triangle, there is a small shallow depression. The prominent rusty bristles from dorsal tubercles on segments 2, 3 and 4 have disappeared, with the exception of a transverse patch from tubercles on 2nd segment, which turn down abruptly over the face, and very few on 3rd segment, all the remaining bristles being black. All tubercles whitish. Black bristles and long sweeping silvery white hairs from all tubercles above spiracles. On 2nd and 3rd segments very few silvery hairs; on remaining tubercles of dorsal area on segments 4 to 12, inclusive, about 20, or more, long sweeping silvery hairs. The row of tubercles posterior to spiracles bear long, bright, rusty red bristles from each tubercle, together with a few black bristles from upper half of tubercle, and also a very few long silvery hairs. All bristles below spiracles bright rusty red. Spiracles white. On the 5th and 6th and 11th, 12th and 13th segments are two small blackish medio-ventral tubercles and two sub-ventral tubercles sparsely covered with rusty bristles, the sub-ventral tubercles having more bristles, which are also longer. The medio-ventral tubercles are close together, almost touching each other. Thoracic feet shiny, black, tipped with brownish, prolegs blackish, reddish at ends.

On the 9th Oct. the two remaining larvæ had spun a slight cocoon, and by the 16th Oct. had changed to pupæ.

The cocoon is very thin, made of white, almost cobweb-like silk, with all the long white and some of the other hairs from larva interwoven. Pupa is plainly distinguishable through the cocoon.

Pupa.—Length 27 mm., width at widest part 8.5 mm.; black. Abdomen minutely pitted; thorax and wing-cases wrinkly. Reddish on abdominal folds between segments. Cremaster rough, short but broad, hollowed below, terminating with a bunch of about a dozen and a half short, capitate, rust-red bristles.

On the 16th June, 1900, a single specimen of the mature larva was found at Cumberland, Ont., to which place an excursion of the Ottawa Field-Naturalists' Club was held. The following description was taken: Length 42 mm., extended 50 mm. General appearance, black caterpillar with rust-red sides, rust-red colour on 2nd, 3rd and 4th segments, and covered with long sweeping silvery hairs. Head, width 3.4 mm., jet black, shiny, bilobed. Face sparsely covered with bristles, those about the mouth-parts short and rusty in colour, those from upper part of face fewer and twice as long, and black in colour. On each side

of face on either side of apex of frontal triangle there is a small shallow depression. The skin of body is a beautiful deep black velvety colour. Dorsal tubercles are grayish, with the exception of those on 2nd, 3rd and 4th segments, which are whitish—all other tubercles are whitish. All tubercles above spiracles on segments 5 to 13 bear long silvery hairs from one-half to three-quarters of an inch in length—some tubercles bear as many as twenty silvery hairs. Besides the silvery hairs, these tubercles also bear many black bristles about a quarter of an inch in length. On segment No. 2 the bristles are all reddish, and many hang down over the head. On segment No. 3 the bristles are rust-red, with a very few black ones, and a very few long silvery hairs. On segment No. 4 the tubercles bear hairs and bristles the same as those on the other segments, with the exception that they also bear rust-red bristles in numbers sufficient to give the anterior portion over which these bristles extend a reddish appearance. The row of tubercles posterior to spiracles bear mostly rust-red bristles, but there are also a few black bristles and a few long sweeping silvery hairs. All bristles below spiracles are bright rust-red. Spiracles white. On the 5th and 6th segments and 11th, 12th and 13th segments are two small blackish medio-ventral tubercles and two sub-ventral tubercles bearing sparse rusty bristles, the sub-ventral tubercles having more bristles, which are also longer. The medio-ventral tubercles are close together, almost touching each other. Thoracic feet black, shiny, tipped with brownish, and bearing sparse, short rusty bristles. Abdominal feet and prolegs black, shiny, reddish at ends, and also bearing short rusty bristles.

On the 20th June this larva spun a cocoon and in due course pupated, the moth emerging on the 29th July—length of pupal stage being about 39 days. In the case of this specimen, the cocoon was much darker than in those bred in 1899, this cause being largely due to the additional number of reddish hairs from dorsal tubercles on segments 2, 3 and 4, being interwoven.

The above two descriptions of the mature larva differ slightly in some respects, but this in all probability is due to variations which doubtless occur in the species.

Food Plant.—The larvæ bred in 1899 were fed on lamb's-quarters (*Chenopodium album*). The one taken this year fed on this plant, as also on dandelion and plantain.

NEW SPECIES OF ANAPHORINÆ.

BY HARRISON G. DYAR, WASHINGTON, D. C.

The following apparently new species of Anaphorinæ have been received since the paper published in CAN. ENT., XXXII., 307, was prepared :

Genus ATOPOCERA, Walsingham.

Wals., Proc. Zool. Soc., London, 1897, p. 169.

Lord Walsingham would probably not have proposed this name if he had been aware of the previous use of the masculine form of the same term (*Atopocerus*, Kraatz, Deut. ent. Zeit., XXXII., 360, 1888. However, the different endings will probably sufficiently distinguish the two genera.

Atopocera Barnesii, n. sp.

Palpi recurved to near end of thorax, with head and thorax dark blackish brown ; legs and abdomen dark gray. Antennæ simple, somewhat compressed. Fore wings with costa convex, inner margin slightly excavate before anal angle ; dark brownish gray, violaceous, tinted, mottled, subreticulate with darker brown, and showing faintly a dark rounded discal dot and irregular quadrate patch on the centre of inner margin, extending toward base along median vein. Hind wing uniform dark brown, the base of fringe narrowly lighter. Expanse 20 mm. Male genitalia with uncus double, two well-separated sharp spines, roundedly and but slightly curved toward tip, the opposing lower piece short ; harpes slender, obliquely ascending, curved, uniform, the tip rounded.

One ♂, Kerrville, Texas (Dr. W. Barnes); U. S. Nat. Mus., type No. 5347.

Genus ANAPHORA, Clemens.

In CAN. ENT., XXXII., 309, I placed *Acrolophus violaceellus*, Beut., as a distinct species, but on further comparison I cannot distinguish it from *Anaphora tenuis*, Wals.

Lord Walsingham separates *tenuis* by the presence of short supplementary processes in the ♂ genitalia, but this character is so obscure that I prefer to give the synoptic table in the following form :

Uncus abruptly angulated.

- Points of uncus distinctly separated. *popeanella*.
 Points of uncus closely approximate. *Morrisoni*.
 Uncus curved over.
 Points of uncus distinctly separate.
 Harpes rounded at tip *tenuis*.
 Harpes oblique below at tip. *macrogaster*.
 Points of uncus closely approximate. *propinqua*.

Genus NEOLOPHUS, Walsingham.

Wals., Trans. Ent. Soc., Lond., 1887, p. 141.

Neolophus persimplex, n. sp.

Palpi short, erect, reaching to vertex of head, and closely appressed, densely hairy, slightly tufted on the joints, the third joint smoother. Body robust, in size and appearance resembling *Pseudanaphora davisellus*, Beut., but veins 8 and 9 of fore wings stalked. Antennæ subserrate, especially towards tips. Head and thorax dark gray. Fore wing pale cinerous gray, mottled with black, heaviest in the centre of the wing, the dark area forming a quadrate or pointed patch on the centre of the inner margin, and a diffuse discal patch, becoming merged in the mottlings along costal edge of wing; area along inner margin lighter gray. Hind wings dark gray. Expanse 22 to 24 mm. Male genitalia with the uncus a single long spine tapering from a broad base, obliquely bent downward; harpes broad, concave, strongly widened at tips, rounded, with a slight projection on the terminal margin.

Nine examples; Huachuca Mts., Arizona; July 16 to Aug. 23 (Dr. W. Barnes); U. S. Nat Mus., type No. 5343.

Genus ORTHOLOPHUS, Walsingham.

Synopsis of Species.

Uncus single.

Harpes slender, uniform in width, constricted near tip. . . . *variabilis*.

Harpes broad, spoon-shaped, narrow at base. *piger*.

Ortholophus piger, n sp.

Palpi erect, reaching above vertex, free from front, rather smoothly scaled. Fore wings light cinerous, slightly violaceous; an ochreous shade over centre of wing, limited inwardly by a black, mottled line from basal third of costa to above centre of inner margin, and outwardly by a similar line from below outer fourth of costa to opposite centre of outer margin,

not reaching either margin. Between these lines the ochreous shade does not reach the costa, and is incised opposite the outer third of inner margin. Wing sparsely irrorate with black, distinctly along costa and in the ochreous shade. A group of dark scales on centre of outer margin. Hind wing blackish, pale along costal edge and extreme base. Expanse 17 mm. Male genitalia with uncus simple, gently curved, broadening toward base; harpes broadly rounded, spoon-shaped, strongly contracted at base, tips evenly rounded.

Three specimens; San Diego, Texas; May 24 to 26 (E. A. Schwarz); U. S. Nat. Mus., type No. 5348.

Genus FELDERIA, Walsingham.

Felderia dorsimacula, n. sp.

Palpi strongly recurved to base of thorax, pale gray before, black outwardly; head and thorax dark gray. Fore wing gray, dark on the costal half, more cinereous along internal margin, mottled with dark brown. A triangular black patch with point on centre of inner margin and the broadest side on the median vein, joined outwardly to a triangular discal patch, that is extended in a curved band nearly to apex, where it becomes obsolete. Hind wings rather light gray, a little darker toward the margin. Expanse 24 to 26 mm. Male genitalia with uncus single, a broad triangular plate, tapering rapidly to a point; harpes slender, rather flat, long, well curved at base, the tips oblique above.

Nine specimens; Huachuca Mts., Arizona; July 24 to Aug. 15 (Dr. W. Barnes); U. S. Nat. Mus., type No. 5346.

THE ACADEMY OF SCIENCE OF ST. LOUIS.

At the first meeting of the autumn, held on the evening of October 15, sixteen persons present, Mr. Wm. H. Roever, of Washington University, presented an elaborate paper discussing in detail the subject of the establishment of the method of least squares. Professor F. E. Nipher presented two papers, entitled respectively Positive Photography, with special reference to eclipse work, and The Frictional Effects of Railway Trains upon the Air; and Mr. C. F. Baker exhibited an interesting collection representing nearly all of the species of fleas thus far known, which he had prepared for the United States National Museum.

Four persons were elected to active membership.

WILLIAM TRELEASE, Recording Secretary.

NEW OR LITTLE KNOWN CALIFORNIAN ORTHOPTERA.

BY SAMUEL H. SCUDDER, CAMBRIDGE, MASS.

The species here brought together were most of them collected by Mr. A. P. Morse, in the summer of 1897, and as they belong to miscellaneous genera, none of which require special revision, the descriptions are here collected for publication.

Loboptera americana Scudd.

The single original specimen of this species was taken in Arizona, and was apparently collected in alcohol, as two fresh specimens taken by Mr. Morse at Cahon Pass, Cal., July 18, differ in colour and in the shape of the pronotum, requiring its partial re-description. The pronotum is fusco-castaneous, only less obscure than the abdomen, very faintly and delicately mottled with luteo-castaneous; it has no mesial constriction (due in the original specimen to contraction in drying), but a regular parabolic curve, and is feebly margined laterally. The tegmina are castaneous, either with the inner half fuscous or with a fuscous median streak. The antennæ are of the length of the body, fusco-luteous, gradually becoming paler distally, very sparsely and delicately verticillate. The legs are uniform luteo-castaneous, the spines concolorous. The form of the whole body is not so oval as indicated in the original figure, but nearly parallel-sided, the abdomen with an independent fullness, and both extremities, but especially the posterior, broadly rounded. The figure also represents the legs as stouter and shorter than they are.

MICROTES, Gen. nov. (μικρότης).

Allied to *Spharagemon* and *Tomonotus*. Moderately robust, but of small size. Head normal, the summit without carination; fastigium of vertex oval, rather deeply impressed, completely margined with elevated walls; lateral foveolæ triangular, a little elongate, but not reaching the tip of the vertical fastigium; frontal costa not very broad, deeply sulcate, subequal but enlarging below; eyes rather small and prominent; antennæ rather coarse, not tapering, blunt-tipped, in the male only a little longer than the head and pronotum together. Pronotum moderately stout, mesially compressed, the median carina moderately high, cut only by the principal sulcus, the lateral canthi distinct, distinctly cut by the principal sulcus and fading in advance of it, the process of the metazona subrectangulate; interspace between both mesosternal and metasternal lobes distinctly transverse in both sexes.

Tegmina moderately broad, the intercalary vein straight, approximate to the median vein; wings crossed by an extramesial fuscous band, cloudy below the humeral field and in that field sending a tænia nearly to the base. Hind femora rather broad, the inferior carina less elevated than the superior, not very arcuate.

The following single species is known to me:

Microtes nubila, sp. nov.

Fuscous or cinereo-fuscous. Head ferrugineo-fuscous blotched with cinereous, the summit more or less rugulose behind the deep and smooth fastigium; frontal costa deeply sulcate throughout, not or but faintly expanded at the ocellus; antennæ fusco-ferruginous, punctate, considerably less than half as long as the tegmina. Pronotum fuscous or ferrugineo-fuscous blotched with cinereous, the lateral lobes with a small central bright quadrate spot, the disc rugulose or granulate, with no defined direction to the independent rugæ, the median carina moderately high and subequal on the prozona, though somewhat sinuate on a lateral view, gradually lowering on the metazona. Tegmina cinereous, crossed by rather broad, often broken, fuscous bands, a broad basal one, a mesial and a generally shattered extramesial one, the cinereous clouds on either side the median fuscous band hardly crossing the wing, but clear and distinct on the costal border, the whole anal area uniform fusco-cinereous; wings hyaline, weakly tinged with citron basally, the humeral field with a longitudinal fusco-fuliginous stripe occupying the basal half and a similar costal stigma, the anal field feebly infumate beyond the middle, especially in a rather narrow transverse extramesial band, which attains but does not follow the hind margin. Hind femora cinereo-testaceous, four times narrowly and obliquely banded with fuscous; hind tibiæ glaucous, with the base black and a postbasal luteous annulus.

Length of body, ♂, 14.5 mm., ♀, 21 mm.; antennæ, ♂, 6 mm.; tegmina, ♂, 15 mm., ♀, 19.5 mm.; hind femora, ♂, 10 mm., ♀, 13 mm.

4 ♂, 1 ♀. Monterey, Cal., July 16. R. W. Doane (Mus. Leland Stanford Jr. University).

Trimerotropis gratiosa, sp. nov.

Allied to *T. pacifica*. Robust, cinereo-testaceous, rather feebly marked with fuscous. Head as in *T. pacifica*, with rather more pronounced margins of the fastigium of the vertex and more sulcate frontal costa; antennæ testaceous at base, beyond fusco-testaceous,

annulate with fuscous. Pronotum robust, generally uniformly testaceous or cinereo-testaceous, rarely longitudinally striped with fuscous, and then the lower part of the head and lateral lobes are pallid; median carina distinct, percurrent, though the prozona, especially in the female, has a prominent median tuberculous swelling; lateral carinae sharp and pronounced, even distinct on the prozona; disk of metazona generally plane, sometimes feebly rounded, densely punctate, the process obtus-angulate in both sexes; lateral lobes terminating behind in an inferior pointed process, as in *T. pacifica*, but placed more completely at posterior margin. Tegmina, as in *T. pacifica*, but with the markings less pronounced, sometimes almost wholly wanting; hind wings feebly washed with citron in basal half, beyond hyaline, but with the apical veins and cross-veins fuscous (more deeply than in *T. pacifica*) and generally with feeble remains of a transverse mesial fuscous band like that of *T. pacifica*, but never continuous and generally altogether confined to the infuscation of some but not all of the veins and cross-veins of that region, and rarely shows the added infumation of some of the cells. Hind femora and tibiae as in *T. pacifica*, the former quite as heavily marked.

Length of body, ♂, 28 mm., ♀, 35 mm.; antennae, ♂, 15 mm., ♀, 13.5 mm.; tegmina, ♂, 26.75 mm., ♀, 31.5 mm.; hind femora, ♂, 15.5 mm., ♀, 18.5 mm.

6 ♂, 6 ♀. Ceres, Cal., Aug. 17. A. P. Morse.

This species differs from *T. pacifica* by its more widely angled pronotal process, robuster and more angulate pronotum, the protuberance of the prozonal disk, and the almost complete, sometimes complete, absence of a band on the hind wings.

Dichopetala brevicauda, sp. nov.

Pale testaceous, the upper surface of head and pronotum tinged with flavous, which terminates on the posterior part of the pronotum at a rectangular bent line of reddish points, its angle at the posterior margin; lateral lobes obscurely marked with fuscous. Pronotum constricted just behind the front margin, emarginate posteriorly next the lower margin of the tegmina; these are testaceous, overlapping, about as long as broad, not truncate, but angulate. All the legs, but especially the hind pair, very long uniform testaceous. Ovipositor no longer than the pronotum, both margins serrate on distal half, besides which the sides of both valves of the same portion bristle with raised rufo-fuscous serrations, arranged linearly and gradually fading baseward.

Length of body, 15 mm.; antennæ, 43 mm.; pronotum, 4 mm.; fore femora, 9 mm.; hind femora, 22 mm.; ovipositor, 4 mm.

1 ♀. Cahon Pass, Cal., July 18. A. P. Morse.

This species differs distinctly from the species heretofore known in the brevity of the ovipositor, and the overlapping of the female tegmina.

Arethusa consuetipes, sp. nov.

Green, the pronotum sometimes testaceous, the basal half of the male tympanum testaceous, but without other markings. Tegmina just surpassing the hind femora, the radial vein sending five or six branches to the posterior margin; tympanum of male tegmina produced, lanceolate, as long behind the transverse vein as in front of it, rounded at tip; legs shorter than common in the genus, the fore and middle femora rectangularly produced at tip.

Length of body, 16 mm.; pronotum, 4.75 mm.; tegmina, 25 mm.; wings, 29.5 mm.; hind femora, 21 mm.

2 ♂. Indio, Cal., July 9. A. P. Morse.

This species differs markedly from the others in the relative brevity of the hind legs. The pronotum lacks the selliform aspect found in the other species, and this species should perhaps be generically distinguished from them.

Clinoppleura flavomarginata, sp. nov.

Testaceous or fusco-testaceous, marked and sculptured quite as in *C. melanoppleura*, but with the infuscation of the lateral lobes of the pronotum either wanting or much less pronounced, and the lateral carinæ of the pronotum, if anything, less distant. The legs, and especially the hind legs, are longer (the hind femora longer than the body), and the anal appendages of the male differ in that the cerci have a much shorter incurved apical hook, much shorter than the body of the cerci themselves, and the infragenital plate is apically truncate and not emarginate.

Length of body, ♂, 23 mm., ♀, 25.5 mm.; pronotum, ♂ ♀, 6.75 mm.; hind femora, ♂, 25.5 mm., ♀, 26.5 mm.; ovipositor, 19 mm.

5 ♂, 6 ♀. Ahwanee, Aug. 15; Ceres, Aug. 17; and Raymond, Cal., Aug. 16; A. P. Morse. Calaveras, Cal.; Riley. Other specimens of this species are in the U. S. National Museum.

Specimens of *C. melanoppleura* were taken by Mr. Morse at Tehachapi, Cal., Aug. 3.

NOTES ON SOME SPECIES OF ACRONYCTA IN THE BRITISH MUSEUM.

BY JOHN B. SMITH, SC. D., RUTGERS COLLEGE, N. J.

Nothing is more aggravating than to be compelled, soon after completing a monographic work, to make changes in the nomenclature and synonymy; yet this is the purpose of this paper concerning the genus *Acronycta*, which was monographed by Dr. H. G. Dyar and myself in Proc. U. S. Nat. Mus., XXI., pp. 1-194, 1898.

It was explained in the introduction to this paper that, because of its interesting early stages, the late Dr. C. V. Riley had been, for years, accumulating material for a thorough study of *Acronycta*; therefore I had made no effort to become closely familiar with the species. Some time before, Dr. A. G. Butler, of the British Museum, attracted in the same way by the larval difference, had divided the species among several genera, referred to several families; allowing superficial and secondary characters to mislead him, as he has since admitted. In 1886, while arranging the Grote material, Dr. Butler made comparisons with other types in the Museum, the results of which were published in 1887 in "Entomologica Americana."

When, in 1891, I examined the British Museum collections, the species of *Acronycta* were still scattered among several families, and, 1st, because Dr. Butler had already made comparisons and published results; 2nd, because Dr. Riley had made comparisons, the results of which were not yet published, I decided to make no original notes myself. I called attention to this point in my Catalogue, Bull. 44, U. S. N. M., p. 35, where I accepted nearly all of Mr. Butler's synonymical references.

In 1900 I had another opportunity to examine the British Museum collections, and the results are here given.

Acronycta felina, Grt. Type and one other specimen so labelled. Three examples from Vancouver are different. There are "types" also in the Edwards and Tepper collections, which are much darker than the B. M. type. The latter is quite a light gray, basal streak to place of t. a. line; not furcate at tip. T. p. line distinct. Reniform a dusky lunule. In my revision I have described as the typical form the examples represented in the American collections.

Acronycta lepusculina, Gn. The type of this species is not in the collection. Three distinct forms are grouped under this specific name.

Acronycta insita, Walk. The type is a female, and very much

resembles at first sight the male type of *dactylina*. My identification of this species is correct.

It may not be quite out of place to say that additional material received in 1899 makes it quite certain that the form named, tentatively, *Canadensis*, on p. 57 of the Revision, is really a good species.

Acronycta innotata, Gn. The type is a male.

Acronycta dactylina, Grt. The type is a somewhat crippled male.

Acronycta contacta, Wlk. The type is a female, and Mr. Grote rightly refers it to *Polia*. The reference of *diffusilis* as a synonym is just a little doubtful; a point to which I will recur in a later paper.

Acronycta sperata, Grt. Types male and female are here. There is also an example marked "type" in the Coll. Am. Ent. Soc.

Acronycta tota, Grt. The type is a male.

Acronycta pallidicoma, Grt. The type is a small female.

Acronycta impressa, Wlk., type; *Acronycta fasciata*, Wlk., type; and *Acronycta Verrillii*, Grt., type: these are all the same species, and are what Mr. Grote called *brumosa*. There is also a "type" of *Verrillii* in the collection of the American Entomological Society.

Acronycta distans, Grt. The type is a male.

Acronycta superans, Gn. The type is a poor female.

Acronycta brumosa, Gn., type, is the same as *A. persuasa*, Harv., type, and the same as a male example of *A. longa*, Gn., which is *not* the type. There is nothing to warrant the belief that *longa* was named by Guenée himself, and, as I have shown, the description fits closely to *xyliniformis*. On the other hand, Mr. Butler was correct in uniting *brumosa* and *superans*, and I was wrong in connecting *brumosa* with *subochrea*. It seems likely that there was a mix-up among the larvæ described by Guenée, and that in this case an erroneous adult was placed with a *subochrea* larva.

Acronycta perdita, Grt. The type is a male.

Acronycta extricata, Grt. The type is a male.

Acronycta subochrea, Grt., type. A good species, and not *impleta*, Wlk.

Acronycta impleta, Wlk., type. *Subochrea*, Grt., is not to be associated with this species; but, on the other hand, *luteicoma*, G. & R., is, without question, the same species.

As a result of these notes, *Acronycta brumosa* in the Revision, p. 117, should read *subochrea*, and corresponding corrections should be made whenever the species there described under that name is referred to.

Luteicoma, G. & R., on p. 152, should read *impleta*, Wlk., and further corrections to be made as in preceding instance

Persuasa, Harv., must be replaced by *brumosa*, Gn., and corrections made as before.

Acronycta hamamelis, Gn., type, is a very dark, powdery form, and is the form named *afflicta* by Grote; not at all the species heretofore so named in our collections.

Acronycta afflicta, Grt., not the type; but so named by Mr. Grote, and like the species so recognized in American collections. This is the same as *A. hamamelis*, Gn., which is also the same as *brumosa*, var. *b* of Gn. This will explain why Guenée describes the larva of *brumosa* for *hamamelis*. He had evidently mixed up three species; a very dark form of what we call *hamamelis* being easily confused with *afflicta*. At all events, I cannot find any difference between type specimens of *hamamelis*, Gn.; *brumosa*, var. *b.*, Gn., and *afflicta*, Grt. The latter name on p. 127 of the Revision must be replaced by *hamamelis* wherever the species there described is referred to; while *hamamelis*, Gn., on p. 141, is really unnamed, and may be called *inclara*.

Acronycta haesitata, Grt., type. A good species, and not *clarescens*, Gn.

Acronycta clarescens, Gn., type. This is the species which was so named in American collections by Mr. Grote, and Mr. Butler was altogether in error in associating it with *hamamelis* (*haesitata*). I was the more ready to accept Mr. Butler's determination because the description does really apply to *haesitata* more nearly than to the species for which it is actually intended. At all events, *haesitata*, Grt., must be restored, and *clarescens*, Gn., must be again transferred to the species so long known as such, and now listed as *pruni*.

Acronycta dentata, Grt., type.

Acronycta increta, Morr. A specimen marked "type" in Mr. Grote's handwriting is in the collection. Associated with it are three examples of *inclara*—i.e., *hamamelis*, Auct., nec. Guenée.

Acronycta dissecta, Grt., type. There is also a type specimen in the collection of the American Entomological Society. The type of *retardata*, Wlk., which has priority, is in the collection of Entomological Society of Ontario.

Acronycta exilis, Grt., type; *A. modica*, Wlk., type. These seem to be alike; but there is perhaps a question. The type of *exilis* is the small, light form, with much yellow in the cell and over the ordinary spots; the type of *modica* is as large as *ovata*, but not so sharply

marked, the secondaries dusky. Four other examples of *modica* are broader winged than *exilis*. Based upon these specimens only, the two names would seem to refer to distinct species; but, in the series before me when I wrote, I failed to find a reliable character to separate them.

Acronycta spinigera, Gn., type; *A. Harveyana*, Grt., type. These are identical. There seems to be no reason for doubting the authenticity of the type label on Guenée's species and, as pointed out in the Revision, the description is thoroughly applicable.

Acronycta ovata, Grt., type. Another type specimen is in the collection of the American Entomological Society.

Acronycta albarufa, Grt., type. The type of *Walkeri*, Andrews, is, I believe, in the possession of Mr. John Akhurst, of Brooklyn.

Acronycta grisea, Wlk., type. The type of *pudorata*, Morr., is in the Tepper collection, now in the possession of the Michigan Agricultural College.

Acronycta lobelia, Gn. The type is a small and not very characteristic specimen without fringes.

Acronycta thoracica, Grt. The type is a female, placed in the collection under the *lobelia* label as identical with it; but the species are distinct.

Acronycta paupercula, Grt. The specimen is of the larger form of the species.

Acronycta falcula, Grt., type. Two examples of *grisea* are erroneously associated with this.

Acronycta parallela, Grt., type.

Acronycta quadrata, Grt. The type is a female.

Acronycta connecta, Grt. The type a male.

Acronycta Radcliffei, Harv. Marked "type" in Mr. Grote's handwriting.

Merolonche spinea, Grt. The type is a female. Another example, also labelled "type," is in the Hy. Edwards collection.

Acronycta lanceolaria, Grt., type; *Acronycta insolita*, Grt., type. The former is a good example, the latter a very poor male: *lanceolaria* I had seen at the time of writing the Revision; but *insolita* was then unknown to me. During the winter of 1899-1900, Dr. Dimmock sent me a few specimens from Massachusetts for determination; among them was *insolita*, and, much to my surprise, examples indicating that it was a very dark form of *lanceolaria*. The two extremes are totally unlike—very pale ashen or whitish gray on the one hand, almost black on the other, yet when the black overlay of *insolita* is removed, *lanceolaria* appears and, of an example now in my collection, it is almost impossible to say where it should be placed.

The material is too scant to make the reference positively; but it is a little problem for our New England friends to solve by breeding. The larva has been found by Mr. Kirkland and is described on p. 172 of the Revision. It feeds on Willow, *Comptonia* and *Gaillardia*.

ADDITIONS TO THE WESTERN JASSID FAUNA.

BY E. D. BALL, FORT COLLINS, COLO.

Thamnotettix chiragrica, n. sp.—Form and size of *T. parallela* nearly, superficially resembling *Cicadula punctifrons*, var. *Americana*. Length, 6 mm.; width, very nearly 2 mm.

Vertex twice wider than long, half longer on middle than against eye, disc convex slightly sloping, rounded to the face, front very broad and short, width at base and length about equal, the disc convex. Pronotum a third longer than the vertex, over twice wider than long; elytra long, almost parallel margined to the apex, venation distinct, apical cells short, their bases truncate, the anteapicals long.

Colour: vertex pale greenish yellow, a pair of round black spots on the posterior margin, slightly nearer the eyes than to each other, a pair of larger, quadrate spots between the ocelli and the eyes, face pale yellow, a few dark arcs on upper part of front, the upper bounding pair crescentiform uniting on the tip of the vertex, a pair of black spots above the antennal sockets and a black band margining the eyes below. Pronotum olive, shading to yellowish in front, a pair of approximate median spots on the anterior submargin, a larger pair against the eyes and a pair of dots just inside the latter, on either side, black. Scutellum pale yellow, a pair of round spots on the disc and a larger, triangular pair just within the basal angles, black. Elytra dark fuscous, the veins and margins milk-white in sharp contrast. Below pale yellow; ovipositor and spot on the last segment black.

Genitalia: ultimate ventral segment of the female three times the length of the penultimate, the lateral margin roundly narrowing, the posterior margin roundly emarginate, the disc posteriorly striated, the middle half angularly elevated.

Described from a single female from Phoenix, Ariz. This is so distinct and easily-recognized a species that there can be no danger in describing it from the single specimen.

Thamnotettix Osborni, n. sp.—Form and general appearance of *Kennicottii*, but smaller and lighter coloured. Length, 5 mm.; width, 1.25 mm.

Vertex longer and narrower than in *Kennicottii*, less than twice as wide as its middle length, disc convex, evenly rounding to the front; front long and narrow, scarcely narrowing until just at the clypeus, genæ scarcely angled, extending below the loræ.

Colour very similar to *Coquilletti*, vertex and face pale creamy washed with orange, ocelli and an irregular spot on either side the vertex at the base, fulvous. Pronotum pale orange fulvous, a narrow transverse band on the middle. Scutellum yellow, brownish or fuscous triangular spots within the basal angles. Elytra fulvous, the anterior half of the corium subhyaline, veins on clavus and the sutural margin narrowly white, claval suture broadly white, with the band on pronotum forming a long triangle.

Genitalia: ultimate ventral segment of female half longer than penultimate, posterior margin broadly rounding, sharply notched either side of a strap-shaped, produced, median tooth; male valve small, almost concealed beneath the large ultimate segment; plates narrow, triangular, the sides convex at base, nearly straight beyond.

Described from a number of specimens taken at Fort Collins and Wray, Colo., and Kimball, Neb. This species is the western representative of *Kennicottii*, with which it has formerly been confused. It may be distinguished by its smaller size and lighter colour as well as by the distinct genitalia.

Thamnotettix Heidemanni, n. sp.—Form of *Cockerelli* nearly, but smaller, the head broader and blunter. Grayish green sprinkled with blood red dots. Length, 4 mm.; width, 1–1.25 mm.

Vertex very slightly angled in front, twice wider at base than its middle length, transversely depressed posteriorly, passage to the front rounded, ocelli rather distant from the eyes, front parallel margined until below the middle, then regularly narrowing to the clypeus, pronotum scarcely twice the length of the vertex, elytra together wedge-shaped.

Colour: vertex and face pale yellow, sutures and about five short arcs on the front fuscous, pronotum pale olive, the anterior margin lighter, scutellum yellow, and orange spot inside each basal angle. Elytra milky subhyaline with a greenish cast, the black tergum showing through. Whole upper surface and face minutely dotted with blood red.

Genitalia: ultimate ventral segment of the female two and one half times as long as the penultimate, the posterior margin broadly rounding or slightly produced on the middle third; male valve small, rounding, about half the length of the ultimate segment, plates broad at base, almost circularly rounding and then extending as a pair of style-like points, pygofer long, tubular, oblique, equalling or exceeding the plates.

Described from eighteen specimens from Cerro Summit and Alder, Colo., both high mountain points.

Thamnotettix Cockerelli, n. sp.—Form and general appearance of *Kennicottii* nearly, with indistinct red mottlings. Length, 5–6 mm.; width, 1.5 mm.

Vertex more than twice wider than long, very little produced in the middle, bluntly angled, with the front transversely depressed behind the middle; face parallel margined to below the antennæ, then narrowing to the nearly parallel-margined clypeus; elytra rather long and strongly appressed behind.

Colour: vertex, face, anterior margin of pronotum and scutellum pale yellow, disc of pronotum and elytra grayish brown with a strong coppery reflection, the whole insect mottled with blood red, veins on elytra light, sutures of front black-lined.

Genitalia: ultimate ventral segment of the female very long, nearly as long as the pygofer, posterior margin broadly and evenly rounding; male valve short, rounding, plates broad at base, evenly rounding to beyond the middle, then produced as acute style-like points, the lateral margin, especially of the points, heavily fringed with stout hairs; a dark line just inside the margin at the base.

Described from numerous specimens from Ward, Rist Canon, Marshall Pass, and Palmer Lake, Colo. Taken from well back in the foothills up to 9,500 ft.

Thamnotettix perexigua, n. sp.—Resembling *Chlorotettix lusoria* and *necopina*, but without the fulvous colour. Length, 8 mm.; width, 2 mm.

Vertex but little longer on middle than at the sides, roundly angled, transversely depressed across the disc; front broad, only slightly convex in either diameter; clypeus long, slightly constricted in the middle; pronotum with the lateral margins long, humeral margins short; elytra long, strong, scarcely narrowing behind.

Colour: Vertex and face slightly greenish-orange, a spot above and another below each ocellus, a waved line along the anterior margin of the vertex, broken in the middle, fuscous; pronotum with a little more of the green than the vertex; elytra a bright greenish-yellow, subhyaline, showing the dark tergum; below bright yellow.

Genitalia: Male valve very short, one-third the length of the ultimate segment, a blunt tooth in the centre; plates long, compressed, a furrow running obliquely through each one, the part outside the furrow curving up and forming a somewhat boat-shaped organ; at the apex of

each plate is a long filament-like appendage resembling that commonly met in *Scaphoideus*.

Described from a single male specimen from Cuernavaca, Mex. (O. W. B.)

Chlorotettix tunicata, n. sp.—Form and general appearance of *Balli*, vertex as in *galbanata*. Length, 7 mm.; width, 1.25 mm.

Vertex half longer on middle than against eye, twice wider than long, disc convex, front and vertex evenly rounded except at apex, which is slightly conical.

Colour pale green, elytra subhyaline, greenish.

Genitalia: ultimate ventral segment of female half longer than penultimate, lateral angles rounding, posterior margin roundly emarginate, one-third the depth of the segment, sometimes slightly notched in the middle, either side of which there is a brown cloud; male valve broad, slightly longer than the ultimate segment, obtusely angulate, plates broad at base, roundly narrowing to a very obtuse, almost truncate, apex, together the shape of a blunt-pointed spoon, convex below with a marginal fringe of coarse spines.

Described from three females and three males from Onaga, Kan. (Crevecoeur). This species may be readily separated from any other described by the male plates.

Chlorotettix nudata, n. sp.—Resembling *stolata* in form and colour; the vertex is more angled and the fulvous reflection less prominent. Length, 7.5 mm.; width, nearly 2 mm.

Vertex twice longer on middle than against eye, slightly conically pointed, front shaped as in *Iusoria*, loræ long and narrow. Elytra long, slightly flaring in the middle, appressed behind.

Colour: pale green, an orange cast on face and vertex, a slightly brownish or fulvous cast on pronotum and elytra, elytra subhyaline, the nervures indistinct.

Genitalia: ultimate ventral segment of the female very short, scarcely as long as the penultimate segment; posterior margin divided into four lobes by a narrow slit in the middle and a pair of broad, shallow notches a little more than half way towards the sides, the margin thin, the plates visible at the base of the pygofer; male valve narrow, obtusely angular, as long as the ultimate segment, plates broad at base, three times the length of the valve, gradually narrowing to the acute slightly produced tips.

Described from one female and one male from Ames, Iowa. Readily separated from any of the species with angled vertices by the genitalia.

Cholorotettix stolata, n. sp.—Form and general appearance of *lusoria* slightly narrower and without the mark on the vertex. Length 7–8 mm.; width 1.5 mm. Male slightly smaller.

Vertex nearly flat on disc, rounding anteriorly, one-third longer on middle than against eye, twice wider than long, front convex line between vertex and front distinct, ocelli prominent, transparent, distant from eyes; elytra long and very narrow, venation as in *lusoria*, indistinct.

Colour: vertex pale yellow, sometimes with a greenish cast, pronotum olive, the disc with a fulvous cast; elytra hyaline green, with an iridescent fulvous tinge.

Genitalia: ultimate ventral segment of the female very long, truncate posteriorly or very slightly emarginate, the centre with a brown mark; male valve as long as the last ventral segment, the apex rounding, the margin notched at the middle, plates rather narrow at base, rapidly roundly narrowing to before the middle, then extending as long attenuate finger-like points.

Described from three females and one male from Cimmaron, Col. Taken in a mountain valley. The genitalia of both male and female are very much like those of *unicolor*, while in shape of head and general appearance it is closely allied to *lusoria* and *nudata*.

Lonatura nebulosa, n. sp.—Form and size of *salsura* nearly, resembles *noctivaga*, but with shorter ovipositor and longer elytra. Length, ♀ 3.5 mm., ♂ 3 mm.; width 1.25 mm.

Brachypterous form: vertex slightly convex, one-fourth wider than long, nearly twice longer on middle than against eye, not quite so long as the pronotum; front longer and narrower than in *noctivaga*, resembling *megalopa*; elytra covering all but two segments of abdomen, evenly rounding behind; venation rather weak, not reticulate.

Colour: vertex dirty straw, a pair of large angular black spots back of the point of the vertex, connected outwardly with a pair of slightly smaller round ones just inside the ocelli; back of these is an interrupted transverse brown band, a brownish fuscous spot against each eye, inside of which is an oblique, olive dash; pronotum pale olive and straw, with a pair of brown spots on the anterior margin equidistant from the median line and the eye, elytra subhyaline, the veins on the inner half milky-

white; abdomen straw colour, with a transverse row of fuscous dots on the middle of each segment, pygofers with a black mark above.

Genitalia: ultimate ventral segment of the female as long as the penultimate, the posterior margin slightly rounding, the disc strongly elevated; male valve very small, rounding, plates triangularly narrowing half their length, then produced into bluntly-tipped points, the margin fringed with long hairs.

Described from a single pair taken at Fort Collins, Colo. The four large black spots in a row on the margin of the vertex will readily distinguish it from any but *noctivaga*, from which the smaller size, narrower face and longer elytra will at once separate it.

Lonatura noctivaga, n. sp.—Form of *salsura*, but larger. Pale straw colour, with four black spots on the vertex and two on the elytra. Length, ♀ 5.5 mm., ♂ 4 mm.; width 1.5 mm.

Brachypterous form: vertex slightly obtusely angled, one-fourth wider than long, two-thirds as long against the eye as on middle; face broad, slightly convex, front almost as broad as long, parallel-margined to the antennæ, then rapidly narrowing, to the long parallel-margined clypeus. Pronotum transverse, scarcely as long as the vertex. Elytra short, obliquely truncate, covering only the first two abdominal segments. Venation obscure, reticulate, especially along the clavus and apical margins of corium.

Colour: vertex creamy white; a pair of black spots just back of the apex, and a large pair between these and the ocelli, the median line, an oblique dash on either side of the disc, and some irregular marks against the eyes, olive. Pronotum creamy, with four olive stripes. Elytra creamy, or olive, with light veins; a black spot on the posterior margin, and sometimes another between this and the scutellum. Abdomen creamy, with olive stripes, or dark olive with creamy stripes.

Genitalia: ultimate ventral segment of the female half longer than the penultimate; lateral margin roundly narrowing; posterior margin truncate or slightly emarginate, with a slight, triangular, median tooth; ovipositor very long, extending beyond the pygofers; male valve short, rounding; plates long, acutely triangular, the lateral margins slightly concave, fringed with a single row of stout hairs.

Described from numerous specimens from Stratton, Neb.; Lamar, and Fort Collins, Colo.

Deltocephalus caperatus, n. sp.—Resembling *Weedi*, but with less flaring elytra; anterior half of vertex black, with a white cross upon it. Length 3 mm.; width 1.25 mm.

Vertex slightly obtusely angled, slightly wider than its median length, one-third longer on middle than against eye, rounding to the front with a slightly produced apex; front convex, rather narrow, lateral margins rounding to the broad clypeus, suture between clypeus and front indistinct; elytra rather broad and stout, broadly rounding behind; venation strong, the central anteapical cell divided, outer sector of clavus tied before the middle of the claval suture.

Colour: vertex, posterior half pale yellow, with a fuscous dot against eye, anterior half shining black, with a strong white cross in the middle, the tip of the cross in a round white spot on the apex of the vertex, the lateral arms also ending in round spots; ocelli in white spots, a yellow line against each eye connecting them with the yellow posterior half of the vertex. Pronotum and scutellum olive, with slightly fuscous markings. Elytra olive subhyaline, the veins broadly white, distinct, narrowly fuscous margined. Face black above, with light arcs, lighter below, a dark band along the apex of front, a stripe on the clypeus, which widens apically; sometimes fuscous margins on loræ and genæ.

Genitalia: ultimate ventral segment of the female twice longer than penultimate, the lateral margins strongly emarginate from the base, the lateral angles rounding, posterior margin twice incised, forming three rounding lobes; beneath the ultimate segment, and visible as a triangular lobe at each lateral angle, is a second membrane as in *compactus*.

Described from three females; one each from: Ray, Colo.; Stratton, Neb., and Ames, Iowa. Readily recognized by the white cross in a black field.

Deltocephalus comatus, n. sp.—Form and general appearance of *colonus*, Uhl. Pale green, with dark spots on vertex, pronotum and scutellum. Length 3 mm., width 1 mm.

Vertex slightly wider than long, obtusely angulate before, but little longer on middle than at eye; eyes long and narrow, pronotum longer than vertex; over half its length within the anterior curve; face rather narrow, rounding; genæ narrow, straight beneath the eyes. Elytra slightly longer than abdomen; venation of the weak *nigrifrons* type.

Colour: vertex pale yellow, a pair of large round spots on the anterior margin near the eyes, a small approximate pair at tip, another pair of small

ones against the eyes, just within the posterior angles, and an oblique dash on either side the disc, black. Pronotum olive, becoming yellowish anteriorly, a pair of elongate spots on the anterior margin just within the eyes; an approximate pair of round ones just back of these, and an oblique dash on either side of the disc, before the middle, in line with the inner margin of the eyes, black. Scutellum pale yellow, a large black triangle well within the lateral angles. Elytra pale green, nervures slightly lighter. Front olive fuscous, a few short arcs and a median stripe, which includes the clypeus, light.

Genitalia: ultimate ventral segment of female about half longer than penultimate; lateral angles slightly rounding, the posterior margin elevated in the middle, and sometimes slightly obtusely toothed; male valve large, very obtusely angulate, plates stout, convexly rounding to a blunt tip, fringed with stout spines.

Described from numerous specimens from Orizaba, Yautepec, and other Mexican points. This species and the following are closely related to *colonus* of Uhler, and belong to the *nigrifrons* group. This species may be readily distinguished from any of the others by the heavy black markings on the pronotum.

Deltocephalus sonorus, n. sp.—Form and general appearance of *nigrifrons* nearly, longer and narrower than *comatus*, olive and fuscous, with milky nervures and reflections. Length 3.25 mm., width less than 1 mm.

Vertex and pronotum similar to those of *comatus*, the eyes long and narrow, enclosing over half of the pronotum. Elytra very long and narrow, with a large appendix; venation strong, two cross nervures, the central anteapical cell very long, dumb-bell shaped but not divided, the apical cell beyond this, small, curved, less than half of the size of the third one.

Colour: vertex a pale dirty yellow; four black spots on the anterior margin, the outer pair often larger than the others, farther from eyes than from inner pair; sometimes a fuscous dot against the eye and irregular brownish markings on disc. Pronotum pale olive and yellowish, with five luteous stripes; scutellum with orange spots along the base. Elytra subhyaline, the veins light, sometimes margined with fuscous. Face brownish fuscous, with light arcs on the front, sometimes the lower part of the face light, with the sutures and a stripe on the clypeus fuscous.

Genitalia: ultimate ventral segment of the female half longer than

penultimate, posterior margin slightly waved; male valve angulate, plates concavely, acutely pointed.

Described from sixteen examples from Tucson, Ariz. (Dr. Kunze.)

Deltocephalus elimatus, n. sp.—Form of *sonorus*, but still longer and narrower. Golden green, with black spots on the vertex. Length 4 mm.

Vertex short but decidedly angulate, one-fourth wider than long, two-thirds the length of the pronotum, disc sloping, rounding to the front; front rather narrow above, almost straight margined to the broad clypeus. Elytra very long and narrow, *Dicraneura*-like; venation similar to *sonorus*, but weak, and lacking the second cross nervure.

Colour: vertex pale yellow, a fuscous spot at apex, a pair of round black spots on the margin nearer the eyes than the apex, and a pair of orange marks on the disc. Pronotum golden or greenish, with five luteous lines. Elytra subhyaline greenish, with a golden reflection. Face yellow, a spot below each ocellus and the antennal pits black.

Genitalia: ultimate ventral segment of female rather narrow at the base, then produced into a remarkably long, blunt-tipped, spatulate process, which is curved up along the margin and at tip; male valve rather long, rounding; plates wide at base, enormously elongated, narrowing to a blunt tip, five times the length of the valve.

Described from three specimens from Sante Fe, Mex. (Barrett.)

The remarkable genitalia of both sexes will readily distinguish this species.

Deltocephalus gnarus, n. sp.—Form and general appearance of *minutus*, V. D., nearly, with a longer vertex and front. Black, with a few markings, and the elytra milky white in female. Male darker. Length, ♀ 2.5 mm., ♂ 2.25 mm.; width 8 mm.

Vertex slightly obtusely angled, the margins straight, one-fourth wider at base than long, one-third longer on middle than against eye, as long as pronotum; front rather narrow, one third longer than wide, the margins gently curved. Pronotum strongly transversely wrinkled; elytra a little longer than body; venation weak; two cross nervures present; the outer anteapical cell very small, acuminate anteriorly.

Colour: vertex shining black, circles around the ocelli, a slender line connecting them with the apex, a cross back of the apex, the margin against the eye, and a pair of oblique dashes on posterior disc, approxi-

mate on the margin, light. Pronotum shining black, a row of submarginal spots, sometimes a median line, and the posterior margin narrowly light. Scutellum black, the lateral margin interruptedly light. Elytra subhyaline white, veins milky. Sometimes in the male the disc of the elytra is darkened up, omitting the cross nervures and the apices of the claval veins. Face black, with margins and arcs on the front light.

Genitalia : ultimate ventral segment of the female twice longer than penultimate ; lateral margin roundly narrowing ; posterior margin truncate, curved around pygofer ; male valve rather large, obtusely angulate ; plates as wide as the valve, roundly narrowing to the slightly produced, acuminate, points.

Described from eight specimens from Ames, Iowa ; taken by the writer on a patch of " dog-hair " *Juncus* growing on the margin of a pond.

Cicadula pоторia, n. sp.—Form and general appearance of *D. gnarus*. Smaller and darker than any other described *Cicadula*. Length, ♀ 2.5 mm., ♂ 2.25 mm.

Vertex nearly right-angled, twice as long on middle as at eye, half wider than long, margin rounding, apex conical, front narrow, wedge-shaped, the margins straight. Pronotum slightly longer than vertex. Elytra considerably longer than the body, obtusely rounding behind. Venation strong, apical cells long, curved, outer branch of first sector obsolete, two anteapical cells.

Colour : female—vertex dark fuscous, the margins, a median line and two dashes on either side, yellow, the posterior dash almost enclosing a round black spot ; front brownish, with fuscous arcs ; lower part of face yellow, with sutures and a stripe on clypeus fuscous. Pronotum and scutellum yellow on margins and fuscous on discs, omitting a yellow longitudinal stripe. Elytra milky subhyaline, sometimes mottled with fuscous on disc. Male—often the same colour and marking as female ; sometimes darkened up until all the light markings are gone except a triangle across face above antennæ.

Genitalia : ultimate ventral segment of female short and straight, or slightly waved posteriorly ; pygofer very short and thick ; male valve short, oval ; plates triangular, their apices produced into long, divergent, style-like, upturned processes.

Described from ten specimens taken from *Juncus*, along with *D. gnarus*, at Ames, Iowa.

Phlepsius josea, n. sp.—Form of *humidus*, but much smaller. Colour red. Length 5.25 mm., width 1.5 mm.

Vertex flat, very slightly depressed posteriorly; half wider than long, nearly twice longer on middle than against eye; anterior margin thick but foliaceous; front narrow, wedge-shaped; clypeus small, linear. Pronotum little longer than the vertex. Elytra moderately stout, compressed behind.

Colour: ground colour pale yellowish olive, but so thickly sprinkled with irregular spots and blotches of blood-red as to give a red appearance to the whole insect, both above and below. The vertex and scutellum have a more decided yellowish cast. The eyes slaty brown. In the light specimens, the red spots are gathered on the nervures of the wings, but in the darker ones the nervures are indistinct.

Genitalia: ultimate ventral segment of the female half longer than the penultimate; the posterior margin roundly truncate, with the lateral angles rounded off; male valve very small, rounding, almost concealed under the long, ultimate segment; plates broad at base, semicircularly rounding, then produced into long, style-like, attingent points.

Described from two males and one female, from the mountains of Colorado. One specimen each from Alder, North Park, and Dutch George's, on the Poudre.

CHANGE OF PREOCCUPIED NAMES.

(1) *Parasa prasina*, Dyar, Psyche VIII., p. 273, 1898 (Central America), is preoccupied by *Parasa prasina*, Alph., Deut. ent. Zeit., 1895, p. 186 (Western China). The Central American species may be called *Parasa wellesca*.

(2) The genus *Callarctia*, Leech, Trans. Ent. Soc., Lond., 1899, p. 168 (West China), is preoccupied by *Callarctia*, Packard, Proc. Ent. Soc., Phil., III., p. 114, 1864 (North America). The Chinese genus may be called *Euleechia*.

HARRISON G. DYAR.

A GENERAL INDEX to the thirty volumes of the Annual Reports of the Entomological Society of Ontario, extending from 1870 to 1899, has been prepared by the Editor of this magazine, and is now in course of publication by the Ontario Department of Agriculture. It will be ready for distribution before the end of the year, and will, no doubt, be of great value to all who have occasion to consult these Reports.

VARIATIONS IN SOME COMMON SPECIES OF BUTTERFLIES.

BY GEO. A. EHLMANN, PITTSBURG, PA.

Papilio asterias, Fabr. Var. *semi-alba*, ♂, nov. var.

On July 31st, 1899, I captured a very interesting form which is out of the ordinary run of the variation which prevails in this species. The size and markings are the same as the normal form, but all the maculations on the primaries are pure white, while the markings on the secondaries are of a deep golden yellow. The under side is the same, but not so conspicuous. Two males in my collection.

Hab.—S. W. Penn'a.*Papilio philenor*, Linn. Var. *obsoleta*, ♂, nov. var.

This form has no submarginal spots either on the fore or hind wings on the upper side; the under side of all the wings is the same as the normal form. Two males in my collection.

Hab.—S. W. Penn'a.*Papilio troilus*, Linn. Var. *Texanus*, ♂, nov. var.

In this form the light suffusion on the hind wings between the submarginal lunules and the discoidal cell is replaced by a well-decided band of ashen gray; the band is half an inch wide throughout; the submarginal spots, both on the fore and hind wings, are much larger than the general form. Expands $4\frac{1}{2}$ inches. Male in my collection.

Hab.—Houston, Texas.*Limnitis ursula*, Fabr. Var. *cerulea*, ♀, nov. var.

The upper side is normal. Under side, on both the fore and hind wings there is a subdiscal band of large bluish spots, very similar to the white bands in both *L. arthemis* and *L. Weidemeyerii*; otherwise it is the same as the regular form. Female in my collection.

Hab.—Charleroi, Penn'a.*Vanessa antiopa*, Linn. Var. *grandis*, ♀, nov. var.

The whole space of the upper side, "except the yellow border and the submarginal black bar," is of a rich chocolate brown; the submarginal row of blue spots is wanting and the yellow border is greatly suffused with brown; under side normal. Female, ex. larva, in my collection.

Hab.—S. W. Penn'a.

DESCRIPTION OF A NEW GENUS IN THE APHELININÆ.

BY WILLIAM H. ASHMEAD.

Myiocnema, new genus.

This new genus falls in a table of the genera of the Aphelininæ next to *Encarsia*, Forster, the antennæ being 8-jointed and the club in the female being 2-jointed.

The head is transverse thin antero-posteriorly, the occiput concave, the vertex impressed; the thorax has several long bristly hairs, and the parapsidal furrows are distinct but very delicate, almost invisible; the front wings have a large discoidal cloud beneath the marginal vein as in *Coccophagus orientalis*, Howard, the stigmal vein is distinct, not very short, but still shorter than the marginal vein and a little shorter than the post-marginal, the marginal vein being a little longer than half the length of the submarginal vein. The hind femora are somewhat thickened, subcompressed, their tibiæ armed behind with stiff bristles; all tarsi 5-jointed, the anterior and middle tarsi being longer than their tibiæ; middle tibiæ with one well-developed apical spur, the hind tibiæ with two short apical spurs. The abdomen seen from above is subovate, flat, beneath subconvex, the ovipositor hidden.

The only male specimen has lost its antennæ, but otherwise, except in having a much smaller, shorter, oval, depressed abdomen, agrees well with the female.

The genus is readily recognized by the hind tibiæ, in both sexes, being armed with stiff black bristles.

Myiocnema Comperei, new species.

♀ length 1.2 mm. Head and thorax above aeneous black; sides of thorax, coxæ and femora blue-black; antennæ and tegulæ brown; knees of middle legs, anterior tibiæ and all tarsi, except terminal joints, yellowish; tibial spurs white; middle and hind tibiæ fuscous; hind tibiæ in both sexes armed with stiff black bristles. Wings hyaline, with a broad fuscous discoidal band below the marginal vein.

Habitat.—Brisbane, Queensland.

Types.—Cat. No. 5442, U. S. N. M.

Described from 1 ♂ and 7 ♀ specimens, received by Dr. L. O. Howard from Mr. Alex. Craw, and bred in July, 1900, from *Lecanium oleæ*, Bernard; collected by Mr. George Compere, the travelling agent of the California State Board of Horticulture at Brisbane, Queensland.

CORRESPONDENCE.

SIR,—I am glad to note that Mr. H. H. Lyman, in his review of my paper on the Argynnis of North America, sums up the matter so well in his last paragraph, wherein he states that "The whole paper shows that much more knowledge is needed before a satisfactory revision of the very difficult North American forms can be made." That is just what the author thought, and why the paper was not called, or thought to be, a *Revision of the genus Argynnis*.

When first written, it was to be read before the Chicago Entomological Society, to my especial friends who knew of my interest in the genus, and the paper was called "A Contribution to the Better Knowledge of the genus Argynnis." The author does not want his friends to think that he has yet attempted to completely solve the Argynnis puzzle, and takes this opportunity to say that any satisfactory revision must be accompanied by plates in natural colours, showing both the upper and under side of each species, a work which can only be accomplished successfully at great expense of time and money.

The author is not a believer in the infallibility of those who name species. His collection contains specimens which have been given three different names by three men supposed to know the species of the genus Argynnis, and specimens taken "in coitu" have been called different species by well-versed students of the genus. What was stated as the polygamous habits of the members of the genus was given as partial proof of what the author believes to be a fact, that many so-called species are varieties or hybrids. He did not, however, feel justified, without further proof, in "relegating a number of names to the synonymy."

Reference was made to the polygamous habits simply to make plain the fact that some of the so-called species are freaks, the result of hybridism. Naturalists, especially closet naturalists, who do not consider it worth their time to study specimens alive, may reach dogmatic conclusions which are entirely satisfactory to themselves, yet which are based on study of a few poor specimens, or even a single individual. The past summer has added to the evidence for hybridism. A correspondent in the field wrote me: "Collecting yesterday where Eurynome was rather abundant, in two instances I found a male Eurynome paying court to females of a dark species double its size, or about same size as Aphrodite. If it is usual for Eurynome to form attachments outside of the species, it may account for several allied forms." This writer is a live naturalist,

and as the Irishman said, "Hit the nail right where a great many have missed it before." Better to "give a counsel of perfection" and hit a few facts than to make a collection of Argynnids with only one or two of each species, and imagine one knows all about the genus.

Permit me to repeat, that each collector interested in the final disentanglement of this genus should do all in his power to build up "large series of species from every locality," for the very reason that "every few miles in every direction is a separate locality," and we must know the fauna of many more of these localities before completing the knowledge of the Argynnids.

As to the dimorphic males, there may be more to say some day, or the author's views may prove incorrect. Stranger things than to name varieties of well-known males as new species have been done by those who hasten to place their names (be they bishops, doctors or laymen) after the names of supposed new species.

What I have written is not with any thought of opening up a controversy, or in any sense to express my objection to the reviewer's remarks; but to make more clear my views upon the subject, and prevent possible wrong conceptions concerning the paper reviewed, both as to its aims and contents.

ARTHUR J. SNYDER.

BOOK NOTICE.

A NATURAL HISTORY OF THE BRITISH LEPIDOPTERA, ETC.—By J. W. Tutt, F. E. S. Vol. II. London and Berlin: May, 1900, pp. vi.—584, plates i.—vii.

The second volume of Mr. Tutt's exhaustive work has now appeared, and this continuation merits all the good words which were so freely spent upon the appearance of the first volume. We have first 100 pages devoted to general subjects, such as Metamorphosis in Lepidoptera, and the External Morphology of the Lepidopterous Pupa. And then (pp. 102-434) there is such a full account of the Psychides as has not yet been published. This is the chief characteristic of Mr. Tutt's work, that everything which has been written on a species has been consulted; the original description is given, the synonym is exhaustive, all known and many new biological facts are carefully added. The number of pages devoted to a single species is thus far in excess and the work has so much more value for consultation. With regard to the Psychides, it

seems extraordinary that there should still be so much new and still to be learned about the European members of this difficult group. The author has been careful to give the gist of what has been published in France and Germany, and concludes his study of the British species by a catalogue of the palaearctic Psychides. Thus there is a broad basis to Mr. Tutt's work, which relieves it from all charge of insularity and should commend it at the same time to continental students no less than to those everywhere interested in the subject.

Pages 434 to the close of the volume are given to the commencement of the Lachneides, and this group is very carefully treated, particular attention being given to Dr. Dyar's studies; while on plate vii. a phyletic tree is reproduced from the pen of our American authority. In the Psychides the views of German writers have been chiefly adopted, in the Lachneides the studies of American authors receive very full attention.

It is not possible, within the limits of this notice, to enter into questions of detail. Mr. Tutt has generally quoted all opinions upon the intricate question of generic synonymy. Where these have differed, in any one case, then the matter has been originally enquired into and a conclusion reached. So far as the reviewer is concerned, these conclusions appear generally acceptable. An exception may perhaps be noted in the case of *Eriogaster*, from which *populi* is excluded as a possible type on the ground that it does not agree with the generic diagnosis. But by its inclusion, Germar evidently thought it did. With questions like this, the historical sifting of types should have nothing to do. If we are to argue upon the verbal interpretation and applicability of the earlier generic diagnoses, there will be no end to the discussion. On the other hand, the reviewer is glad to adopt Mr. Tutt's opinion as to the type of *Gastropacha*, which term may be retained for our *Americana*, etc.

To conclude: No general faunal study is known to the reviewer which can compare with Mr. Tutt's in scope and execution. It is greatly to be hoped that the volumes we now have will be followed by others to the completion of the entire work.—A. R. G.

The Annual Meeting of the Entomological Society of Ontario will be held in the rooms of the Society, 429 Wellington Street, London, on Wednesday and Thursday, Nov. 14th and 15th. All members are cordially invited to attend, and are requested to bring with them any rare or interesting specimens that they may have obtained. Donations to the Society's collections will be very welcome.

Mailed November 3rd, 1900.

The Canadian Entomologist.

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No. 12

CONTENTS.

| | | | |
|---|-----|---|-----|
| Howard—Remarks on <i>Psorophora ciliata</i> | 353 | Grote—Corrections..... | 365 |
| Poling— <i>Neophasia Terleotii</i> | 358 | Ashmead—Changes in Generic Names in Hymenoptera..... | 368 |
| Grote—Classification of the Butterflies..... | 359 | Obituary— / Dr. Otto Staudinger..... | 368 |
| King—New <i>Pulvinaria</i> from New Mexico..... | 360 | / Rev. G. D. Hulst..... | 369 |
| Cockerell—New Mexico Bees..... | 361 | Gibson—Life-history of <i>Arctia phalerata</i> .. | 369 |
| Hanham—Manitoba Butterflies..... | 365 | Entomological Society of Ontario..... | 376 |

REMARKS ON PSOROPHORA CILIATA, WITH NOTES ON ITS EARLY STAGES.

BY L. O. HOWARD.

Psorophora ciliata, Fabr., is the only species of the genus *Psorophora* known to occur in the United States. It is a widespread species and is known to the writer to occur in Massachusetts, New Jersey, Pennsylvania, District of Columbia, Virginia, Kentucky, Illinois, Florida, Louisiana, Arkansas, Nebraska, Texas and California. It is, however, rare in its northern range and seems to be a lower austral form. It may have a tropical range, but among many mosquitoes received by the writer during the past year from Mexico, Nicaragua and Cuba, this species does not occur. In his "Notes on the Mosquitoes of the United States" (Bulletin 25, New Series, Division of Entomology, U. S. Department of Agriculture), published August 23rd, 1900, the writer calls attention to the fact that *Psorophora* and *Megarhinus* have not been studied by investigators engaged in working upon the transfer of *Haematamoebæ* by mosquitoes, and urges that physicians and bacteriologists in our Southern States pay some attention to the mosquitoes of these genera.

At the time when the bulletin was written nothing was known about the early stages of *Psorophora*. A large series of living specimens was captured in June of the present year at St. Elmo, Va., by Mr. Pratt, and we expected that we should be able to secure eggs without difficulty and to study the insect in its different stages. The females were placed alive in large battery jars, under conditions which had repeatedly been successful with *Culex* and *Anopheles*, but no eggs were deposited. This brought

the writer to the conclusion that either the confined specimens were not impregnated, or that they had already deposited all of their eggs, or that the breeding habits differ from those of the mosquitoes of the other genera mentioned.

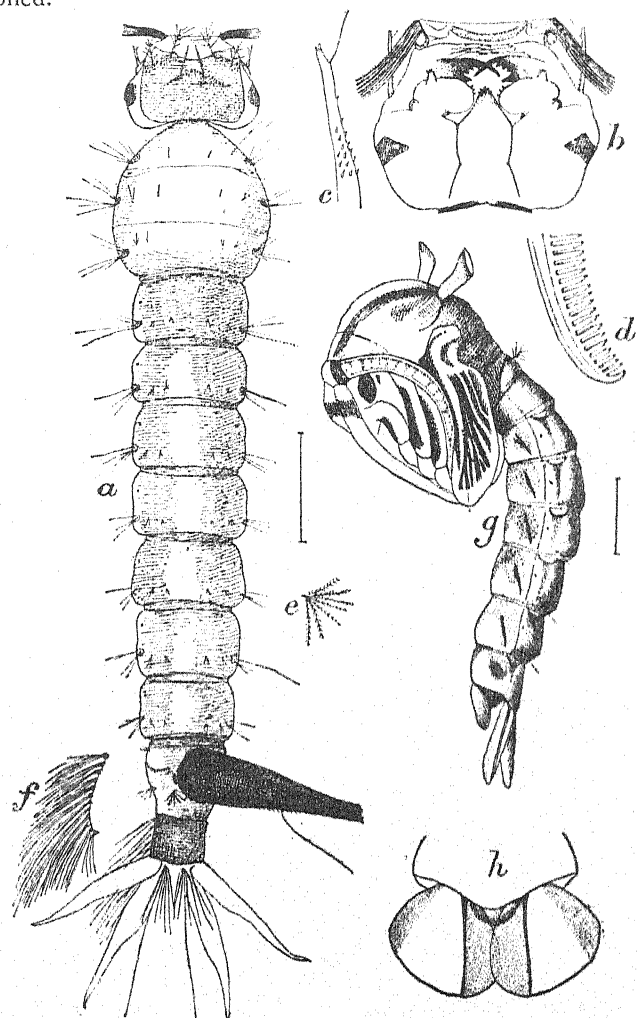


FIG. 31.—*Psorophora ciliata*: a, full-grown larva; b, head of same from below; c, antenna of same; d, a mandibular filament; e, tuft from penultimate segment of same; f, fringe from same; g, pupa; h, anal flaps of same. Enlarged (original).

On August 30th, 1900, some very large mosquito larvæ and pupæ were received from Mr. Wm. P. Seal, of the Aquarium Supply Company, at Delair, N. J. An examination of these specimens convinced me that they could be nothing else than the larvæ and pupæ of *P. ciliata*. The first specimens received were in alcohol, and Mr. Seal was informed of their probable identity and urged to send on living specimens in water and to endeavor to rear the adult himself. It was then, however, unfortunately, too late. Mr. Seal wrote that during the summer a small creek and some earth ponds on his place became entirely dry, in consequence of which

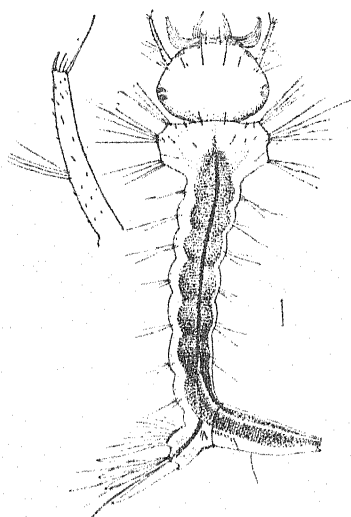


FIG. 32.—*Psorophora ciliata*: young larva with enlarged antenna at left. Enlarged (original).

all fish in them died. Some time in August there was a sufficient rainfall to fill a few of the deepest places, which became almost alive with mosquito larvæ. These were used for fish food until it was noticed that they were developing to the pupa stage, when coal oil was immediately poured on the water. It was when the coal oil was being applied that the big larvæ and pupæ were first noticed. Mr. Seal had been a collecting naturalist for 26 years, supplying material for the aquarium, for biological research, and having discovered some low forms of life new to science, described by Leidy and Ryder; but in all his experience he had never observed such large mosquito larvæ.

On being assured of the novelty and importance of his observation, Mr. Seal promised to watch for the subsequent appearance of similar larvæ, and on September 20th last was able to forward other specimens which appeared after a rain which occurred about the 15th of September or a little before. Mr. Seal was able to distinguish between them and the ordinary *Culex* larvæ, and wrote that they were very scarce, perhaps one of them to many thousands of the others. On the 25th of September additional larvæ and pupæ were sent by Mr. Seal, and from these specimens the accompanying drawings were made. The larva is structurally of very great interest. On comparison with the larva of *Culex*, which it resembles more nearly than that of *Anopheles*, it will be seen that the respiratory siphon is longer, that the anal flaps are longer and more pointed, that the hair fringe on the venter of the anal segment is much longer and denser, and that the mouth-parts differ in very important particulars. The labium is well differentiated into ligula and paraglossa and the labial palpi are represented by little simple processes. The laciniae of the maxillæ are beautifully modified into mandibular-like structures, each with a long terminal tooth and stout basal tooth and three intermediate teeth. These not only resemble mandibles, but have a mandibular function, since they are indubitably used in the mastication of food. Other mosquito larvæ studied fed upon spores of algæ and other small particles which appeared to require no mastication, but this larva descends to the bottom of the water and has been noticed to grasp a bit of vegetation a half-inch long and to actually chew it. The maxillary galea is membraneous and furnished with long terminal cilia. The mandibles are long, brush-like organs, each element of which is beautifully pectinate, as shown in Fig. 31 *d*. The clypeus is bent over the front of the head, forming a chitinous overlapping lip which reaches nearly to the maxilla.

The duration of the pupal stage in specimens received was 4 to 5 days, and adults issued on the 27th and 28th of September, and confirmed the determination of the species as *P. ciliata*. In the last sending young larvæ were found, shown at Fig. 32.

The adult of this species is at once distinguished from all other mosquitoes by the peculiar vertical scales on the legs, as shown in the illustration, Fig. 33. The colour of the insect is dark yellowish, with infuscated wings.

The breeding places in which these larvæ were found were small depressions in the bed of a small stream and similar hollows in certain small ponds, all of which were dry the greater part

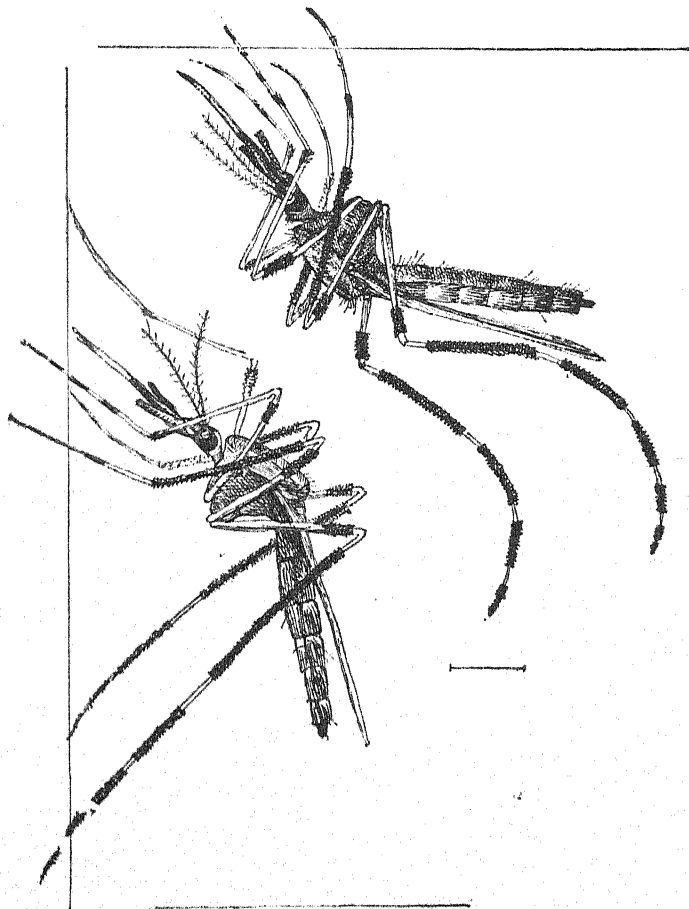


FIG. 33.—*Psorophora ciliata*: adult females, showing resting position on side wall and ceiling. Enlarged (original).

of the past summer. After they first dried in the spring they were barren of fish and vegetation. Mr. Seal is satisfied that the insect is very rare in the vicinity of Philadelphia. It is now important to discover the egg of this interesting species.

NOTES ON *NEOPHASIA TERLOOTII*, BHR., FROM ARIZONA, WITH DESCRIPTION OF A NEW VARIETY.

BY OTTO C. POLING, QUINCY, ILL.

Neophasia Terlootii was described a great many years ago*, and the description being in Latin, it is not surprising that Dr. Strecker overlooked it in the hurry to publish his description of the female I sent him, which he supposed had not been previously described. It is a little surprising, however, that Dr. Skinner, who had the first opportunity to examine one of my examples of *Terlootii*, should have failed to recognize the generic characters of the insect until Dr. Strecker's description as *Neophasia epyaxa* was published.

The first female example of *Terlootii* taken, which is the type of "*Archonias lyceas*, Skinner" †, and is now in my collection, agrees with the type of *Neophasia epyaxa*, Strk., which I sent him after a careful comparison. These two specimens were taken in Cochise County, Arizona, to which locality I sent one of my regular collectors to spend the past season in studying the habits and collecting a series of examples of this interesting butterfly.

Of the series before me, most of the examples agree with the description of *Terlootii* male, and subsequent illustrations and descriptions of specimens sent out. There are, however, three females and one male which differ so much from the others as to well deserve a varietal name, and with the kind permission of my friend, Dr. William Barnes, I am allowed to use a most appropriate name, which he had intended to bestow on the species had it not been previously described, *Neophasia Terlootii*, var. *Princetonia*, n. var. Male differs from type in having the margin of hind wings washed with pale red on both surfaces, of a shade somewhat lighter than that of the female. The under surface is more heavily washed with red than the upper. There is a submarginal entire black band on both surfaces of hind wings, which is not quite so broad as in the female *menapia*, but the veins between this band and the outer margin are more heavily washed with black scales than in the latter species.

Female—From the types of *Neophasia epyaxa*, Strk., and "*Archonias lyceas*," Skinner, this form differs in having a much greater suffusion

*Trans. Am. Ent. Soc., Phil., II., 304 (1869).

† Ent. News, XI., 533, plate XIV. (Sept., 1900).

of black on both surfaces of the wings, and in the absence of the orange spots in outer marginal band of hind wing. There is also a large patch of orange in the centre of the cell.

[The Curator, on behalf of the Entomological Society of Ontario, desires to acknowledge with grateful thanks Mr. Poling's very acceptable gift of specimens of both sexes of this remarkably interesting butterfly—*Neophasia Terlootii*.]

CLASSIFICATION OF THE BUTTERFLIES.

BY A. R. GROTE, HILDESHEIM, GERMANY.

In the course of my already-published studies, the probabilities as to the homology of the last anal vein of the Papilionides primary have varied. From preparations of the pupal wing of the Hesperiaes, it has become clear that the fork to second anal at base is the remains of the third anal vein, which is irregular and more extended in the fore wing of the chrysalis and does not attain the outer margin. It is furcate and connected with the second anal in the pupal stage. On the other hand, the downwardly curved, short, last and free anal vein of the Papilionid primary cannot be homologous with this, as, indeed, I originally contended. This vein reaches the internal margin, and is probably a survival of the fourth anal. This fact points to a different origin for the two groups, which I have finally defined as follows:

- A. Butterflies having a short fourth anal vein on primaries, running downwardly free from base of wing to internal margin; on secondaries only one anal vein.....PAPILIONIDES.
- B. Butterflies having a short third anal vein on primaries, joining outwardly the second near base of wing (this fork sometimes wanting by reduction and always thinner than second anal or degenerate), fourth anal wanting, and having more than one anal vein on secondaries.....HESPERIAES.

In order to bring out the probable phylogeny in the classification, I accord superfamily value to the two divisions. The Papilionides include the three families: Parnassiidae, Teinopalpidæ and Papilionidæ, separable on neurational features, the first two appearing as specializations of the last in the order given. The Hesperiaes include not only the Lycenids, as indicated by Fabricius, but all the rest of the butterflies, of which I regard the Pierids and Blues as the more recent developments, while the Nymphalids and Skippers represent older types.

A NEW PULVINARIA FROM NEW MEXICO.

BY GEO. B. KING, LAWRENCE, MASS.

Pulvinaria Tinsleyi, n. sp.

Shriveled adult female scales on the twigs, light brown, elliptical, convex. Ovisac, clear white, texture as in *P. innumerabilis*. After boiling in K. O. H., derm colourless, not pitted or tessellate. Legs and anal plates tinged with yellow. Spines of lateral cleft in threes, one long and curved; 76 μ long, two quite short, 28 μ long. Margin with one row of stout blunt spines 40 μ long, 6 broad. Anal plates heart shaped, each 100 μ broad and 136 μ long. Antennæ 7-jointed, width quite constant, but the length of the joints seems to be quite variable. I have examined ten, with the following results in μ : Joint (1) 24 to 40, (2) 40-60, (3) 68-80, (4) 52-64, (5) 28-36, (6) 28-40, (7) 44-52. Formula 3472651. Joint 3 is always longest, while 4 is nearly as long, but never equal; 1 is always the shortest, 5 and 6 are next and sometimes nearly equal. Joints 2 and 3 have two long hairs each; 5 and 6 have 3 each; 7 seems to have 9, the terminal one very long.

Legs normal, with the coxa 80 μ long, 100 broad. Femur with trochanter, 208 long, 68 broad. Tibia, 180 long, 24 broad. Tarsus, 92 long, 20 broad. Claw, 24 long. The trochanter has one short terminal hair. Tibia and tarsus each with four short subterminal hairs. Digitules of tarsus and claw normal, with knobbed ends. No satisfactory measurements can be given of the dead and shriveled adult scales; but those boiled and pressed under a cover glass seem to be nearly circular, about 5 mm. in diameter. *Larva*, just hatched,—yellow, elliptical, marginal spines absent. Antennæ 6-jointed, measuring in μ : (1) 20, (2) 16, (3) 32, (4) 16, (5) 16, (6) 36. Leg, coxa 48. Femur with trochanter, 60. Tibia, 48. Tarsus, 44. Larvæ, perhaps about three or four weeks old, on the leaves of the food plant, have well-developed 7-jointed antennæ, and large blunt marginal spines.

Hab.—On *Celtis* sp., in a draw near the road from Pecacho to Roswell, in the Pecos Valley, New Mexico, about 20-25 miles west of Roswell. Some of the limbs were almost covered with the scales, and many of the leaves were about killed. Collected by Prof. Tinsley, August, 1900, and sent to Prof. Cockerell, who turned it over to me for study. *Pulvinaria innumerabilis* has been recorded from *Celtis occidentalis*, but *innumerabilis* has nothing to do with the species above described, although the two are superficially similar, and might be confused at first sight.

NOTES ON NEW MEXICO BEES.

BY T. D. A. COCKERELL, N. M. AGR. EXP. STATION.

Bombomelecta larreae, n. sp.

♀.—Length $12\frac{1}{2}$ mm.; general build and structure of *B. thoracica*, but the scutellum is convex with a central depression, and wholly without spines; while the claws have the inner division short and broadly truncate. The maxillary palpi are 6-jointed, and the mandibles have a strong tooth on the inner side. Black; pubescence of the face and vertex pale brown; of the occiput, labrum and clypeus, black; of the pleura, metathorax and scutellum, black; of the post-scutellum, yellowish, especially noticeable at the sides; of the mesothorax, orange-fulvous, short, dense and conspicuous in front, thin behind. Abdomen with broad but inconspicuous ochreous bands on segments 2 to 4, more or less interrupted in the middle on 2 and 4, represented on the first segment by lateral patches, and a few ochreous hairs even in the middle; fifth segment with black hairs. Antennæ entirely black, apex truncate, the corners of the truncation rounded. Legs black, with black pubescence; spurs black, hind spur of hind tibia larger than the other, and somewhat bent. Wings dark fuliginous, with hyaline patches on the third transverso-cubital and second recurrent nervures; venation resembling that of *B. thoracica*, var. *fulvida*, except that the first recurrent nervure joins the second submarginal cell almost at its apex.

Hab.—Mesilla Park, New Mexico, at flowers of *Larrea tridentata*, May 9, 1900.

Epeolus occidentalis, Cresson, var. *segregatus*, n. var.

♂.—Differs from typical *occidentalis* from Colorado, received from Mr. Fox, as follows: Spurs of four hind tibiæ pale brownish, only the minutely ciliate margins black; tegulæ deep orange-ferruginous, shining and distinctly punctured; the two longitudinal pale ochreous stripes on mesothorax narrow, very well defined, not reaching the front margin; marginal cell shorter and broader; wings grayish, not yellowish; light band at apex of first abdominal segment narrowly interrupted in the middle; apical plate of abdomen subtruncate; second and third ventral segments with appressed white hair-bands. The first joint of flagellum is ferruginous beneath.

♀.—Similar to the ♂. Scape and first two joints of flagellum ferruginous beneath; longitudinal stripes on mesothorax subclavate, and attaining the anterior margin; scutellum ferruginous; all the abdominal

bands interrupted in the middle; fifth segment with a pyriform light patch on each side. The last ventral segment is dark, a little hoary in some lights, contrastive strongly with the broadly snow-white hind margins of the three previous segments; apex of abdomen very obtuse, the apical ventral segment not produced.

Distinguished from *E. lunatus* by the transverse black band, instead of semilunar mark, on the first abdominal segment. The lower part of the pleura is free from hair, and sparsely punctured on a shining ground. This insect seems intermediate between *lunatus* and *occidentalis*, and it may be that all three are races of one species.

Hab.—♂. Las Vegas Hot Springs, N. M., July 11. ♀. Las Vegas, at flowers of *Petalostemon candidus*, Aug. 11. (W. Porter.)

Epeolus remigatus, Fabr., var. *Martini*, n. var.

♀.—Length about 14 mm. Head dull from the excessively close punctures; clypeus with some larger punctures interspersed, and a more or less distinct longitudinal raised line; dark mark on mesothorax anchor-shaped, the lateral lobes long; pleura with very little light colour; first segment of abdomen with a broad triangle of black on its disc, the band below the triangle narrowly interrupted; band on second segment very thick, and produced obliquely upwards at the sides, forming an acute angle where it bends; sides of fifth abdominal segment black; antennæ and legs black, tarsi becoming ferruginous, middle tibiæ with a stripe of orange-fulvous pubescence.

Differs from *E. robustus* by the dull, densely-punctured clypeus and face, different ornamentation of thorax, band on second abdominal segment bent back at sides, etc.

Differs from *E. concavus* by not having the last ventral segment produced or curved.

Differs from *E. Texanus*, v. *nigripes*, by the ornamentation of the thorax and abdomen, and considerably shorter lateral teeth of scutellum. In life the eyes of *Martini* have the upper third green, the rest black.

Hab.—Romersville, N. M., Aug. 6, 1899. (Martin D. Cockerell.) This is very possibly a distinct species.

Epeolus Cressoni, Rob., 1867. New to New Mexico.

Las Vegas, July 24, at flowers of *Sphaeralcea Fendleri lobata*, 1 ♂ (Wilmatte Porter); San Ignacio, Sept. 1, Aug. 31, ♀ (W. Porter and Ckll.). A female from near San Ignacio, Aug. 15 (W. Porter), is unusually large, 13 mm. long.

Diadasia diminuta, Cresson.

Santa Fé and Las Vegas, abundant at flowers of Malvaceæ; caught at Las Vegas on *Sphæralcea Fendleri lobata*, *S. cuspidata*, *Malvastrum coccineum*, *M. dissectum* and *Sidalcea neomexicana*, on the last by Mr. A. Garlick.

Diadasia apacha, Cresson.

Mesilla Valley, abundant at flowers of *Sphæralcea Fendleri lobata*. Heretofore recorded as *D. diminuta* (Trans. Am. Ent. Soc., XXV., 193). Its nesting habits are recorded in *Nature*, Sept. 17, 1896, p. 461.

D. diminuta was described from the ♂, *apacha* from the ♀; they are perhaps only subspecifically distinct. The ♀ *diminuta* is distinguished from *apacha* by the dark tegulæ and the thorax broader between the wings; the stigma also averages darker. The *D. diminuta* recorded from Juarez, Mexico (Cat. Abejas de Mexico, p. 14), is *apacha*.

Centris Cockerelli, Fox, Pr. Acad. Nat. Sci. Phila., 1899, p. 68. ♀.

I have little doubt this is the true ♀ of *C. lanosa*; i. e., of the Mesilla Valley insect regarded as *lanosa*.

Centris rhodopus, var. *pulchrior*, n. var.

Mesilla Park, N. M., June 24, one ♂. This is the ♂ variety described by Mr. Fox in Proc. Acad. Nat. Sci. Phila., 1899, p. 68, but not named. I think it is probably a distinct species. The legs are ferruginous (the hind femora blackish beneath at base), and the basal joint of the hind tarsi has long white hair like that on the tibia. The hind margins of the abdominal segments have distinct pale hair-bands.

Centris Hoffmannseggiae, Ckll., Am. Mag. Nat. Hist., April, 1897, p. 395.

♂ (not ♀).

Mr. Fox regarded the insect which I had described as ♀ *C. lanosa* as the true ♀ of *C. Hoffmannseggiae*; but it differed from the ♂ in its larger size, and entirely different pubescence of the legs, so I thought to treat it as a distinct species. It appears to be fond of the flowers of the mesquite (*Prosopis glandulosa*), on which it was again taken on May 15 of the present year, by Miss Nora Newberry. On May 16, at Mesilla Park, individuals of *Centris* were seen hovering in the air, but not visiting flowers. They were so agile that it was only with considerable difficulty that three were caught. These proved to be males of *C. Hoffmannseggiae*, but larger (13½–14 mm.) than the single male hitherto known. At the same place, the females, their hind legs covered with orange pollen, were found entering their nests, which were tunnels in the ground, about two

inches vertically, and then laterally about four inches. The female is the insect which I described as ♀ *lanosa*, and thus Mr. Fox's reference of it to *Hoffmansseggiae* is confirmed.

Panurginus Porterae, n. sp.

♂.—Length about $7\frac{1}{2}$ mm., black; head and thorax with fairly long, thin whitish pubescence; head transversely suboval; clypeus, except the two black dots, and lateral face marks, lemon yellow; face below antennæ without any conspicuous hair; labrum, mandibles, anterior edge and receding lateral pieces of clypeus (which are hairy) all dark; lateral face-marks triangular, their upper limit barely above the level of the upper edge of the clypeus; antennæ entirely black; front above antennæ cancellate with large punctures; vertex with large punctures, a smooth impunctate area on each side; thorax entirely black; mesothorax and scutellum shining, with well-separated large punctures; legs black, tarsi very dark brown; tegulæ dark brown; wings slightly smoky; nervures and stigma piceous; abdomen rather long and narrow, punctured except the broad hind margins of the segments; apex with two sharp points.

♀.—Stouter; face entirely black; abdomen with very small punctures, extremely sparse on first segment.

Hab.—Beulah, N. M. (Wilmatte Porter). The ♂ was taken Aug. 25, 1899.

From the description, I thought this might very well be a variety of *P. picipes* (Cress.), but Mr. W. J. Fox has kindly sent me a drawing of the face-marks of Cresson's type ♂ of *picipes*, and it is evidently a different species. In *picipes* the lateral face-mark is a small band along the orbital margin, running considerably above the level of the top of the clypeus, and not at all triangular. In my table in Trans. Am. Ent. Soc., XXV., p. 196, the ♂ of *Porterae* runs to *picipes*. From *P. innuptus* the ♂ is easily known by the triangular lateral face-marks (those of *innuptus* resemble those of *picipes*) and the dark stigma; the ♀ differs from that of *innuptus* by the dark stigma and nervures, the much darker tegulæ, the larger punctures of the mesothorax, the first abdominal segment much more sparsely punctured at the sides, and the black tarsi.

Panurginus Cressoniellus, Ckll. New to New Mexico.

Beulah, N. M., 3 ♀; near Beulah, Aug. 23, 1899, 1 ♂, 3 ♀. All collected by Miss Wilmatte Porter.

ADDITIONS TO THE LIST OF MANITOBA BUTTERFLIES,
WITH NOTES ON OTHER SPECIES.

BY A. W. HANHAM, WINNIPEG, MAN.

Euptoieta claudia, Cram.—This species had never even been observed in previous years, but this season appeared plentifully at Bird's Hill in June, and again in August (16th) and September (4th): it was also met with at St. James, just outside the city limits. The species is usually common in prairie districts farther west.

Melitea Harrisii, Scud.—Taken at Bird's Hill on July 1st, 1899. This season I came across a larva in the act of pupating, but missed the butterflies.

Chionobas alberta.—I captured one specimen at Bird's Hill on May 24th, 1899. This was my first experience with a *Chionobas* "on the wing" up here, and I nearly missed it (being a case of mistaken identity).

Thecla irus, Gdt., and *Thecla angustus*, Kirby.—Bird's Hill, May 24th (and later), 1899, not uncommon. None seen on same date this season.

Thecla titus, Fabr.—One specimen at Bird's Hill this season (August 16); not uncommon at Brandon.

Chrysophanus dione, Scud.—One specimen at Silver Height on July 22nd, 1898. Mr. Boger took a nice lot this season at Brandon.

Lycena rustica, Edw.—Bird's Hill, June 8th and 10th, 1899, and May 24th this year, fairly plentiful locally. Also taken at Aweme in 1899.

Pieris protodice, Bd.-Lec.—Bird's Hill, this year, in June and September. Though generally common in the West, I have not yet taken this species nearer the city than Bird's Hill.

Pamphila Manitoba, Scud.—Earlier captures were all the var. *Assiniboia*, Lyman; this season on August 16th, at Bird's Hill, I took the typical form in some abundance.

Pamphila hianna, Scud.—Bird's Hill, taken June 8th and 10th, 1899, and one specimen this year on May 24th. It was a plentiful species last June (1899) in the Rounthwaite district.

The season of 1900 opened earlier than usual in Manitoba; on May 24th the early "skippers" and "hair-streaks" appeared to be over; on that date *Lycena rustica* was out, some being quite worn, and on my next visit in June none were visible. I also took *Lycena sapiolus*. Ordinary seasons neither of these "blues" would be on the wing much

before the middle of June, the latter flying into July. *Vanessa Milbertii* and *Pyrameis atalanta* and *cardui* were unusually abundant during the spring and early summer.

Argynnis nevadensis, Edw.—I captured my first specimen of this handsome "fritillary" on June 25th at Carberry. Mr. Boger reports it to have been plentiful in June at the Experimental Farm, Brandon. It has not turned up yet at Winnipeg.

Neonympha canthus, Bd.-Lec.—Some I took at Carberry on June 26th appeared to be unusually pale for fresh specimens.

Erebia discoidalis, Kirby, and *Erebia epipsodea*, Butl.—Specimens of both these species have been received from Mr. Dennis, of Beulah, taken there in 1899.

Hipparchia Ridingsii, Edw.—Mr. Norman Criddle, of Aweme, takes this species in his district.

Chionobas varuna, Edw.—In June, 1899, Mr. Marmont, of Rounthwaite, and I took a good series on the slopes and summit of the Brandon Hills, and in the sandy district near Treesbank and that of Aweme it occurred quite plentifully. Some examples of *Alberta* were captured during my visit to his place.

Chionobas jutta, Hbn.—Through the kindness of the Messrs. Criddle and their guidance from Aweme into the Douglas swamp (some 10 or 12 miles), we were able to see this fine butterfly on the wing. The date, June 18th (1899), however, was a little too late, and few of those netted were worth keeping. I think the specimens were somewhat larger and more brightly coloured than those from the Gomin swamp, Quebec.

Pieris napi, Esp.—Early in May "whites" were plentiful in the vicinity of my house, and I supposed that they were *rape*, which is our common *Pieris* now. Examining my small boy's captures later on, I was surprised to find that he had been taking the above species, usually a rarity here, and that there was not a single *rape* in the lot.

Anthocharis olympia, Edw.—Examples of this species have been taken by Mr. N. Criddle, and by Mr. Robinson, of the Experimental Farm, Brandon.

Colias eurytheme, Bdv.—This season has been noted for the abundance of "oranges"; they have been common from May into October. In 1899, I did not see one the whole season. "Albinos" were plentiful in June; on the 27th at Carberry this form predominated; unfortunately, few were any good.

Pamphila ottoe, Edw. — I have not met with this species at Winnipeg since my captures in 1895, but it turned up at Brandon this year, having been taken by Mr. Robinson.

Pamphila uncas, Edw. — On June 27th I got three beautifully fresh specimens at Carberry. They were all taken off milkweek. Also captured this year at Brandon by Messrs. Boger and Robinson.

Pyrgus tessellata, Scud. — The previous record was not my capture, and I had never seen the species in the district until this year, when I bagged several at Bird's Hill on June 13th, and at Carberry on the 27th I got two more.

CORRECTIONS.

BY A. RADCLIFFE GROTE, A. M.

To prevent misconception of my paper in the October number of the CANADIAN ENTOMOLOGIST, on the Neuration of Lepidoptera, there should be added to the statement on p. 291, line 2 from bottom of the page, the words: "On the hind wings." The Hesperiadæ have two anal veins on the secondaries, the Papilionidæ only one remaining.

Also, at the close of the article, p. 292, the words "of the fore wings" should be intercalated, in the concluding sentence, after "internal vein." I am writing of the last short downwardly curved veins of the Papilionidæ' primary wing, and which Dr. Chapman regards as homologous with the fourth anal, not the "third," as I have given in the paper. Upon this difference in the appearance and retention of the anal veins of the primaries, I have founded the theory of the diphyletism of the diurnals. The Papilionidæ will thus have lost the third anal of primaries and retained the fourth, which is free and joins the internal margin. The Hesperiadæ have generally retained a remnant of the third anal pupal vein, in the shape of a fork to second anal, which is absorbed in many brush-footed butterflies, but is determinate in the Limnadiæ, Libytheidæ and Nemeobiidæ, while the fourth anal of the fore wings has become lost.

I finally would mention that the authorities give Borkhausen as author to *Hydroecia nictitans*, not Linné, as I had written without having consulted the earlier references to the species. The work of Duponchel should be cited: "Lep. Eur.," not "Lep. Ent.," as printed in my last paper on "Types of Noctuid Genera."

SOME CHANGES IN GENERIC NAMES IN THE HYMENOPTERA.

BY WILLIAM H. ASHMEAD.

The following generic names in the Hymenoptera, alphabetically arranged, being preoccupied in other groups of zoology, must be changed, and I propose for them the following names :

- Brachycephalus*, Förster, 1868, *nec* Holland, 1857, to *Brachycranium*.
Cacus, Riley, 1893, *nec* Selys, 1854, to *Oethecoctonus*.
Canidia, Holmgren, 1858, *nec* Thompson, 1857, to *Canidiella*.
Ceratoma, Cresson, 1865, *nec* Reeves, 1850, to *Ceratogastra*.
Clepticus, Haliday, 1839, *nec* Cuvier, 1829, to *Mischoxorides*.
Celonotus, Förster, 1862, *nec* Peters, 1855, to *Protaphidius*.
Ecphora, Förster, 1868, *nec* Conrad, 1843, to *Ecphoropsis*.
Eucorystes, Marshall, 1888, *nec* Sclater, 1883, to *Eucorystoides*.
Holconotus, Förster, 1862, *nec* Agassiz, 1864, to *Aulonotus*.
Liogaster, Kriechbaumer, 1890, *nec* Perty, 1834, to *Liotryphon*.
Limneria, Holmgren, 1888, *nec* Adams, 1857, to *Limnerium*.
Obba, Tosquinet, 1896, *nec* Beck, 1837, to *Tosquimetia*.
Ophiodes, Hartig, 1840, *nec* Wagler, 1828, to *Ophiogastra*.
Thalassa, Holmgren, 1859, *nec* Adams, 1858, to *Megarhyssa*.
Zarhynchus, Ashmead, 1900, *nec* Oberholzer, 1899, to *Rhynchothyreus*.
Zetetes, Förster, 1862, *nec* Cabanis, 1859, to *Opiellus*.

OBITUARY.

DR. OTTO STAUDINGER.

The death of this prominent Lepidopterist is announced as having taken place on October 13, at Lucerne, Switzerland, during a journey undertaken for his health, and at the age of 71 years. Dr. Staudinger's work is well known. It has been given to few to acquire his influence over theoretical and practical workers alike. The new edition of his standard catalogue of palearctic Lepidoptera, upon which the work has been long in hand, has not yet appeared, but may very shortly be expected. In this place we can only express our profound regret at the closing of a long and prosperous career which has greatly benefited the general cause of Entomology.—A. R. G.

REV. G. D. HULST.

We deeply regret to announce the death of the Rev. George Duryea Hulst, Ph. D., which took place suddenly on Monday, Nov. 5th, at his residence, 15 Himrod street, Brooklyn, N. Y. Mr. Hulst was in his fifty-fourth year, and had been pastor of the South Bushwick Reformed Church for over thirty years. In the entomological world he was widely known from his researches in the Lepidoptera, and especially for his work in the Geometridæ, in which family he was recognized as an authority. He was a frequent contributor to the pages of this magazine, and also published elsewhere many elaborate papers on his special department of study. His removal from among us, when in the prime of life, and with apparently many years of useful work before him, will be keenly regretted by systematic entomologists everywhere.

THE LIFE-HISTORY OF *ARCTIA PHALERATA*, HARR.

BY ARTHUR GIBSON, ASSISTANT, DIVISION OF ENTOMOLOGY, CENTRAL EXPERIMENTAL FARM, OTTAWA.

On the 18th June, 1900, Mr. C. T. Hills, of Chicago, was kind enough to send me a batch of about 79 eggs of *Arctia phalerata*, Harr. The parent moth was captured on the 12th June, and enclosed in a box over night; on the next day, the 13th, the eggs were laid.

Egg.—.75 mm. in width, semi-ovoid, about as high as wide, shiny, smooth, creamy-white, concave at base.

The eggs hatched on the 20th and 21st of June. Duration of egg stage 7 or 8 days.

Stage I.—Length 2 mm. General colour dirty cream. Head .3 mm. wide, bilobed, shiny, brownish-black, and bearing sparse slender hairs. On each segment is a transverse row of black tubercles, which appear to occur almost in a line in the middle of the segments. These tubercles bear long black and silvery hairs, and are situated in a light brownish field, which encircles each tubercle. On segments 5 to 12, inclusive, slightly nearer to centre of dorsum, and anterior to larger dorsal tubercles, are two smaller tubercles, which also bear one or two hairs. Thoracic feet and prolegs concolorous.

On the 23rd June the larvæ were swollen, and on the 24th they passed the first moult.

Stage II.—Length 3.5 mm. General colour, some blackish-brown with a light stripe on dorsum, others light brownish with a creamy stripe on dorsum. Head .5 to .6 mm. wide, sparsely covered with short light hairs and long slender dark hairs, bilobed, black at apex and on cheeks; frontal triangle whitish, with a slight tinge of brown. In the darker specimens almost the whole of the head is black. Dorsal tubercles large, with exception of the two anterior tubercles on segments 5 to 12, inclusive, which appear smaller, and are like minute dots. The large dorsal tubercles are now situated in a distinct light brown band. Lateral, stigmatal and ventral tubercles smaller than dorsal series, varying in size from lateral down. Between lateral and stigmatal series of tubercles are brownish blotches, which give the appearance of stripes, or bands. These markings are not so plain on the darker specimens. The bristles from dorsal tubercles are black, with the exception of the small tubercles on segments 5 to 12, inclusive, which bear one or two whitish hairs. Remaining tubercles bear blackish and whitish bristles. Stigmata brown. Thoracic feet and prolegs concolorous, darkened at tips.

On the 27th June most of the larvæ passed the second moult.

Stage III.—Length 5 mm. General appearance blackish hairy larvæ, with a pale yellowish stripe on dorsum, which is almost imperceptible in some specimens. In the majority of the specimens, however, this stripe was plainly distinguishable. Head .8 to 1.0 mm. wide, bilobed, shiny, bluish black, sparsely covered with long blackish hairs; frontal triangle lighter in colour, with dark centre, in some specimens all black. Dorsal tubercles large and shiny black, and bearing black bristles, varying in length, some long and some short. Medio-dorsal tubercles on segments 5 to 12, inclusive, are very small, and bear two or more short white hairs. This series of tubercles almost touches the pale yellowish dorsal stripe. Lateral, stigmatal and remaining tubercles smaller than dorsal tubercles, and bearing black and white bristles. In some specimens the skin of the body is a deep black, with the exception of the dorsal stripe; others are lighter in colour of skin, and have the appearance of two stripes on the sides, but this is due to the black shiny tubercles being more plainly noticeable than the skin. Stigmata dark brown. Thoracic feet concolorous, splashed with shiny black; prolegs concolorous.

On the 1st July a number of larvæ passed the third moult, and by the 3rd all had moulted.

Stage IV.—Length 7.5 mm. General appearance, black hairy larvæ. tubercles very prominent, some specimens having a yellowish dorsal stripe. Of the whole batch of 71 larvæ, the dorsal stripe was only present in seven specimens. In the majority of the other specimens just the faintest sign of this stripe was to be seen, while the remainder were perfectly black. Head 1.2 to 1.4 mm. wide, bilobed, shiny, brownish-black, sparsely covered with long blackish hairs. Bristles from dorsal tubercles black, with a few white hairs intermingled. The bristles from the stigmatal and ventral tubercles in this moult are of a light rusty hue, in some specimens much brighter than in others; there are also a few black bristles from these tubercles. The medio-dorsal tubercles on segments 5 to 12, inclusive, are very small and black in colour, bearing two or three bristles each. The dorsal tubercles are very large, and bear numerous black bristles. Stigmata black. Thoracic feet shiny, jet black, covered with short reddish and blackish hairs. Prolegs concolorous, rather translucent, light at tips.

On the 7th July three larvæ passed the fourth moult, and on the 8th the majority of the remainder moulted.

Stage V.—Length 11.5 mm. General appearance, black larvæ with black tubercles, bearing short and long black bristles, with rust-red bristles from tubercles on lower half of sides. Head 1.5 to 1.8 mm. wide, depressed at apex, shiny, black, sparsely covered with short whitish and long blackish hairs. The reddish bristles on dorsum of second segment turn down abruptly over the face, and give it a brownish appearance. The dorsal stripe has disappeared, and is not present in any of the specimens. Bristles from dorsal tubercles black, with a few grayish ones intermingled. On the 12th and 13th segments the dorsal tubercles bear one or two long hairs, black in colour, tipped with gray. The bristles from upper half of stigmatal tubercles are black, those from lower half, as well as all bristles below stigmata, rust-red. Spiracles black, with a light orange centre, with exception of those on 2nd and 12th segments, which are wholly bright orange. Thoracic feet shiny, jet black, covered sparsely with short rust-red bristles; prolegs concolorous, lighter at tips, also bearing short rust-red bristles.

On the 14th July three larvæ passed the fifth moult, and by the 17th nearly all had moulted.

Stage VI.—Length 15 mm. General appearance the same as after the fourth moult; the rust-red bristles on sides and dorsum of second segment appear brighter. Head 2.0 to 2.4 mm. wide, of about the same

size as the body, shiny, jet black, slightly depressed at apex, sparsely covered with slender blackish and silvery hairs, with a number of short light rust-red hairs around the mouth-parts. Bristles from the black tubercles on the dorsum, black. Dorsal tubercles on 12th and 13th segments bear three or four long hairs. Upper half of stigmatal tubercles bear black bristles, lower half rust-red bristles. Bristles from all tubercles beneath spiracles bright rust-red. On dorsum of segment 2 the bristles from front half of tubercles are bright rust-red. These turn down over the face, and give front portion of larvæ a reddish appearance. Spiracles orange, in some specimens faint. Skin of body deep velvety black. Thoracic feet shiny, jet black, sparsely covered with short rust-red bristles. Prolegs, upper two-thirds shiny, jet black; lower third and claspers dull reddish; the whole bearing short rust-red bristles.

On the 23rd July three larvæ passed the sixth moult, and by the 31st all but a few had moulted.

Stage VII.—Length 24 mm. General appearance, velvety black larvæ with black tubercles, bearing short stiff black bristles on dorsum, and bright rust-red bristles from the tubercles below stigmata. In some specimens there is a distinct clear ochre-yellow dorsal stripe, expanded somewhat in the middle of each segment. In others, instead of the dorsal stripe there is a series of elongated spots of the same colour, one on each segment; the number of spots constituting this series varies, some specimens having as many as nine, others only one or two. Head 2.5 to 2.8 mm. wide, slightly smaller than second segment; shiny, jet black, depressed at apex, and sparsely covered with short reddish hairs, and some long slender blackish hairs, the reddish hairs being mostly around the mouth-parts. Base of antennæ and mentum pale. Bristles from dorsal tubercles black. On dorsum of segment 2 the anterior half of tubercles bear rust-red bristles, which turn down over the face. In some specimens the bristles from tubercles on segment 2 are all reddish, with only a few black bristles. Dorsal tubercles on segment 3 also bear some rust-red bristles in some specimens. Medio-dorsal tubercles on segments 5 to 12, inclusive, bear a small bunch of short black bristles. Tubercles on dorsum of segments 12 and 13 bear a few longer black bristles. In some specimens all the dorsal tubercles bear a very few bristles of a dark rusty colour. Lower halves of the stigmatal tubercles bear bright rust-red bristles. All bristles below spiracles, including those from ventral tubercles, are bright rust-red. Tubercle i. small, about one-fifth size of tubercle ii.; tubercles

without shining base. Bristles smooth, not barbed. Stigmata bright orange. Thoracic feet shiny, jet black, dull brownish at tips, and sparsely covered with rust-red bristles, some short and some long. Prolegs, upper two-thirds shiny, jet black; lower third and claspers light rust-red, covered sparsely with short, reddish bristles.

Length of mature larva before spinning cocoon 30 mm., width at widest part 8.5 mm.

On the 26th July one larva passed the sixth moult, and showed the clear ochre-yellow dorsal stripe (rather faint on segments 2, 3 and 13). Another moulted the same day, and in this specimen, instead of the dorsal stripe, occurred a series of elongated ochre-yellow spots, one on each segment, from segment 4 to 12, inclusive. On the 26th July, also, seven more specimens passed the sixth moult, the ochre-yellow varying in these specimens from very faint elongated spots only on one or two segments, to a distinct dorsal stripe, faint on segments 2, 3 and 13. On the 28th one larva moulted, and in this instance the dorsal stripe was distinct, but only present on segments 8 to 12, inclusive. In this, the sixth and last moult, out of the whole batch of 64 larvæ, only 17 specimens showed the ochre-yellow on dorsum; the remaining 47 were perfectly black, and no dorsal stripe or spots whatever were present.

On the 1st August eight specimens began to spin their slight cocoons between the leaves, and on the following day changed to pupæ. In some later specimens it was two days before the pupa was formed, but in the majority of the specimens the change took place the following day.

The cocoon is very thin, and is simply a slight network or web of reddish-brown silk, covering the pupa. The larva draws the leaves of the food-plant together by means of threads of silk, or folds up a leaf, fastening the edges together, and spins its slight cocoon inside.

Pupa.—Length 19 mm., width at widest part 6 mm.; black slightly pruinose, abdomen minutely pitted, thorax and wing-cases slightly wrinkled, dull reddish-brown in folds of abdomen. Cremaster rough and short, rounded above and hollowed below, terminating in a bunch of about 20 capitate bright rust-red bristles of varying lengths.

On the morning of the 13th August four female moths emerged, and by the following morning five more females had appeared. During the afternoon of the 14th the first male moth emerged. The moths continued to emerge every day for about a week and a half.

Length of pupal stage about 12 days.

On the 23rd August two live females and one male, all of which had just emerged, were placed out of doors in a cage made of wire cloth, and two days later the females laid a large number of eggs.

On the 2nd September, 80 larvæ hatched, and by the 4th September 35 more had emerged. The description already made of this stage agreed with these specimens.

The larvæ which hatched on the 4th September passed the first moult on the morning of the 9th, and showed no difference from those described in former brood.

On the 12th September one larva passed the second moult, and many others on the following day. These also were the same as the specimens described previously.

On the 17th September a number passed the third moult, the remaining specimens moulting on the 18th and 19th. At this time the number of larvæ living was 85, and in this moult, out of the whole batch, 22 specimens showed the dorsal stripe; in three or four of these specimens the stripe was present on segments 3 to 11, inclusive, but in most of the specimens it was only observable on a few of the middle segments.

On the 25th September a number passed the fourth moult, and by the 28th nearly all had moulted. The larvæ in this moult showed no sign whatever of the dorsal stripe, and the description already given above of this stage answers well for this batch.

On the 4th October some passed the fifth moult, and by the 7th nearly all had moulted. These also corresponded with the description already made. In many of the specimens, however, the rust-red bristles on sides were not so bright or numerous as in the first lot of larvæ.

On the 16th October eight specimens passed the sixth moult. At this time—in fact, a few days earlier—the larvæ were very quiet, and had almost stopped feeding, only a very little frass being found each day in the breeding jars.

On the 18th October four more specimens passed the sixth moult. Of these 12 larvæ, only one specimen showed any sign of a dorsal stripe, and in this case the colour of the stripe was just a little lighter than the velvety black of the skin. The rust-red bristles from sides of these specimens were also not so bright or numerous as those already described. The hairs on the face were mostly blackish, and in some specimens none of the dorsal tubercles bore rust-red bristles.

From the 16th to the 26th October the larvæ had practically stopped feeding, and at this latter date they were put down in a cool cellar, to be left there throughout the winter.

Food-plant.—The larvæ of the first brood were fed on dandelion and plantain, those of the second on dandelion only.

In the Journal of the New York Entomological Society for March, 1900, Dr. Dyar publishes an article entitled "Preliminary Notes on the Larvæ of the Genus *Arctia*." In this paper some remarks are made regarding the mature larvæ of *Arctia phalerata* and *Arctia vittata*, and it is stated that "the matter is not decided beyond question as to whether *phalerata* or *vittata* has the larva with the dorsal stripe, or whether this is a specific character at all." The notes on the mature larvæ of *phalerata*, as given in the present paper, throw some light upon the matter, and it will be readily seen that the dorsal stripe is not a specific character, as it is present in some mature larvæ, and totally absent in others. This will agree with both Professor French's description and also with the notes of the Department of Agriculture at Washington.

With regard to *vittata*, I might say that on the 26th May last I found a specimen of the mature larva at Ottawa, which spun a very slight cocoon two days later, and produced the moth on the 1st June. This larva was a reddish, hairy caterpillar, with no sign whatever of a dorsal stripe, and not at all like those mentioned above.

The following description was taken from the cast skin and head of larva: Head 3.3 mm. wide, jet black, bearing sparse long slender blackish and reddish hairs, and some short rust-red hairs. Skin of body velvety black, tubercles rough, not polished, bearing bright rust-red bristles, those on dorsum slightly darker. Bristles smooth, not barbed. Tubercle i. about one-fifth size of tubercle ii. Thoracic feet blackish brown, covered sparsely with rust-red bristles.

Pupa.—Length 24 mm., width at widest part 8 mm.; black, pruinose, covered with a bloom similar to that on a ripe unrubbed plum; folds of abdominal segments with slight reddish tinge. Abdomen minutely pitted, wing-cases and thorax slightly wrinkled. Cremaster rough, short, rounded above, slightly hollowed beneath, and terminating in a bunch of about 18 capitate rust-red bristles of varying lengths.

From the first brood of *phalerata* 55 moths were bred. In over half of these specimens the costal edge of the primaries is narrowly black, that of the others being yellow. Dr. Dyar, in the above paper, says that the

costal edge of *phalerata* is yellow, and remarks that this may possibly be a distinguishing character between *phalerata* and *nais*, as the costal edge of all his specimens of the latter is black. This, of course, agrees with many of our specimens of *phalerata*, but on account of the black edging being present in the majority of those bred at Ottawa, it would appear that this character is not of specific importance. In about ten female specimens all the yellow markings on the primaries are suffused with the ruddy colour of the secondaries, but there is a remarkable lack of variation in the whole series, both with regard to colour and markings.

I beg gratefully to acknowledge assistance from Dr. Fletcher in confirming my notes in the above investigation, and also to Dr. Dyar for the determination of this species and of the specimen of *A. vittata* referred to above.

ENTOMOLOGICAL SOCIETY OF ONTARIO.

The thirty-seventh annual meeting of the Society was held in London on the 13th, 14th and 15th of November. On the first evening a joint meeting with the London Horticultural Society took place in the Normal School, and was very largely attended. Prof. James, Deputy Minister of Agriculture, presided, and gave an interesting address on the beneficial effects of the pursuit of horticulture. Mr. W. E. Saunders read a paper on "The planting, care and pruning of the trees in the parks and streets of the city," and was followed by Dr. James Fletcher, who gave an address, illustrated by lantern pictures, on the growth of trees, and the insect enemies of the flower and fruit garden.

The morning of the 14th was taken up with a business meeting of the Council. In the afternoon the various reports of the Directors, Officers, Branches and Sections were read, and then followed an important discussion on the San José scale in Ontario. Mr. Fisher, the Provincial Inspector, gave an account of the work that had been performed during the year for the repression of the scale, and the results that had been obtained from the use of various remedies. Dr. Fletcher, Prof. Webster (of Ohio), Prof. Lochhead, Mr. Dearness, Dr. Fyles, and others, took part in the discussion. The speakers insisted strongly upon the very dangerous character of this insect, its wide dissemination in several parts of the Province, and the destruction that would be surely wrought among the orchards and fruit plantations if stringent measures were not taken for its subjugation.

In the evening the Rev. Dr. Fyles read his presidential address on "Insects as agents in the cross-fertilization of blossoms," and papers were read by Prof. Webster on the Codling moth, Prof. Lochhead on Forest Insects, and Mr. Gibson on the life-history of *Arctia phalerata*. The points brought forward by the speakers were discussed with much interest and animation at the close of each paper.

On Thursday a large number of papers were read during the day, which will be published, with a full account of the proceedings, in the forthcoming Annual Report. The election of officers resulted as follows:

President—Rev. T. W. Fyles, D.C.L., F.L.S., South Quebec.

Vice-President—Professor William Lochhead, Ontario Agricultural College, Guelph.

Secretary—William E. Saunders, London.

Treasurer—J. A. Balkwill, London.

Directors: Division No. 1—C. H. Young, Ottawa.

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Division No. 4—James Johnson, Bartonville.

Division No. 5—R. W. Rennie, London.

Directors Ex-officio (ex-Presidents of the Society)—Professor Wm. Saunders, L.L.D., F.L.S., F.R.S.C., Director of the Experimental Farms, Ottawa; Rev. C. J. S. Bethune, M.A., D.C.L., F.R.S.C., London; James Fletcher, L.L.D., F.L.S., F.R.S.C., Dominion Entomologist and Botanist, Experimental Farms, Ottawa; W. H. Harrington, F.R.S.C., Ottawa; John Dearnness, Normal School, London; Henry H. Lyman, M.A., Montreal.

Librarian and Curator—J. Alston Moffat, London.

Auditors—J. H. Bowman and W. H. Hamilton, London.

Editor of the Canadian Entomologist—Rev. Dr. Bethune, London.

Editing Committee—Dr. J. Fletcher, Ottawa; H. H. Lyman, Montreal; J. D. Evans, Trenton; W. H. Harrington, Ottawa; Prof. Lochhead, Guelph.

Delegate to the Royal Society—Rev. Dr. Bethune, London.

Delegates to the Western Fair—J. Dearnness and Dr. Bethune, London.

Committee on Field Days—Dr. Woolverton, Messrs. Balkwill, Bowman, Elliott, Law, Moffat, Percival, Rennie, and Saunders, London.

Library and Rooms Committee—Messrs. Balkwill, Bethune, Dearnness, Moffat, and Saunders, London.

ERRATA.

Vol. XXX., 1898, page 280, line 10 from bottom, for "clavipennis" read "claripennis."—D. W. COQUILLET.

Page 236, third line from bottom, for *Guavis* read *Gauris*.

Page 320, line 22 from top, for "varieties of Aphrodite and Bischoffi;" read "varieties of Aphrodite, and Bischoffi."

[Comma after Aphrodite and another after Bischoffi, instead of semicolon.]

NOTE ON *SESIA ARCTICA*, BEUTEN.

BY WM. BEUTENMÜLLER.

In advance of my forthcoming memoir of the Sesiidæ, I published in the current volume of the CANADIAN ENTOMOLOGIST, page 208, a description of a new *Sesia* from Alaska, but through a curious blunder on my part omitted to mention the name of the species, and herewith propose to call it *Sesia arctica*.

Mailed December 10, 1900.

INDEX TO VOLUME XXXII.

- Aencia Farnesiana*, Coccus on, 65, 66.
Acidalia niphe, 7.
 Acknowledgments, 184, 359.
Acrocaula, n. gen., 169.
 " *comacornella*, n. sp., 170.
Acrolophus *Arizonellus*, 309.
 " *cervinus*, 308.
 " synopsis of species, 308.
 " *violaceellus*, 309, 326.
Acronycta, notes on species in the British Museum, 333.
Acronycta, species taken in Manitoba, 93, 94.
Aerosoma maculata, n. sp., 100.
Agapostemon melliventris, 304.
 " *radiatus*, 303.
 " *Texanus*, 303.
 " *viridulus*, 393.
Agentiinae, table of genera, 296.
Agonoderus pallipes injuring corn, 271.
Agraulis vanillae, 8.
 Aldrich, J. M., article by, 318.
Allograpta obliqua, 60.
Amblychila cylindricornis, 109.
Amphicarpæa monoica, Tineid feeding on, 244.
Amphisa luridana, 239.
Anaphora macrogaster, 327.
 " *Morrisoni*, 327.
 " *popeanella*, 309, 327.
 " *propinqua*, 327.
 " *tenuis*, 326.
Anaphorinae, new species of, 326.
 " table of genera, 306.
Anisodactylus sericeus, 270.
Anosia menippe, 8.
Anthocharis ausonides, 119.
 " *flora*, 108.
 " *olympia*, 366.
Anytus obscurus, n. sp., 218.
 " *profundus*, n. sp., 218.
Apamea didyma, type of genus, 210, 292.
Aphelininae, a new genus from Chile, 167.
Aphelininae, description of new genus in, 349.
Aphides, new species of, 29, 56.
Aphidius Fletcheri, 60.
 " *Washingtonensis*, 60.
Aphytis, n. gen., 168.
 " *Chilensis*, n. sp., 168.
Archonias lycaeus, 358.
Arctia phalerata, life-history of, 369.
 " *vittata*, 375.
Arethæa consuetipes, n. sp., 332.
Argas Americanus, 20.
 " *columbæ*, 20.
 " *persicus*, 17.
 " *reflexus*, 20.
Argynnis of North America: Arthur J. Snyder, 319, 350.
Argynnis aglaia, 7.
 " *Freija*, 119.
 " *Frigga*, var. *Saga*, 119.
 " *Nevadensis*, 366.
 " the neuraton of, 7.
Argyrodes Floridana, n. sp., 98.
Artemisia Californica, Coccus on, 313.
Ascalaphus (*Myrmeleonidae*), 184.
Ashmead, W. H., articles by, 145, 185, 295, 349, 368.
Aspidiotus hederæ, 214.
 " parasites of, 168.
 " *Crawii*, 214.
 " *cydoniæ*, 215.
 " *rapax*, 214.
Aspidiotus (Hemiberlesia) candidulus, n. sp., 130.
Aster umbellatus, root-borer of, 280.
Asterolecanium hederæ, 215.
Atopocera Barnesii, n. sp., 326.
Atteva aurea, 39.
 " *gemma*, 39.
Atylotus bicolor, 247.
Aurora nigrocinctella, n. sp., 176.
Automeris Janus, spine-bearing larva of, 236.
Automeris, notes on, 235.
 Baker, C. F., articles by, 49, 207.
 Ball, E. D., articles by, 200, 337.
 Banks, Nathan, articles by, 30, 96.
 Barnes, William, article by, 42.
 Barrett, O. W., article by, 234.
Bassus lætorius, 59.
 Bees, New Mexico, of the genus *Cœlioxy*s, 297.

- Rees, notes on Colorado, 303.
 Rees, notes on New Mexico, 361.
 Rembidium 4-maculatum injuring strawberry plants, 271.
 Bethune, C. J. S., articles by, 1, 119, 120.
 Reutenmuller, W., articles by, 208, 301, 377.
 Bird, Henry, articles by, 226, 276.
 Bogue, E. E., article by, 205.
 Bolter collection of insects, 184.
Bombomelecta larreae, n. sp., 361.
Bombyx cunea, 16, 87, 122, 193, 286.
 Book notices, 119, 159, 192, 216, 319, 351.
Brachycephalus = *Brachycranium*, n. gen., 368.
 Brazil, new species of Coccidæ from, 3.
Brenthia pavonicella, 243.
 " the genus, 243.
Brenthia hecate, 7.
 Burdock (Lappa major), insect affecting, 15.
 Butler, Arthur G., article by, 91.
 Butterflies, additions to list of Manitoba, 365.
 Butterflies, classification of the, 359.
 Butterflies from the Yukon, 119.
 Butterflies, neuration of, 7, 289, 359, 367.
 Butterflies, new species and varieties of, 42, 92, 348, 358.
 Butterflies, sale of, 132.
 Butterfly lists, 8, 365.

Caberodes subochrearia, n. sp., 107.
Cacus = *Oethecoctonus*, n. gen., 368.
 Callactia, Chinese genus, changed to *Euleechia*, 347.
Callilepis insularis, n. sp., 97.
Calopompilus, n. gen., 188.
 Cambridge Natural History, vol. vi., some notes on, 234.
 CAMEEL DOORN TREE (*Acacia giraffæ*), 23.
 Campanita (little bell cocoon), 235.
Canarsia gracilella, n. sp., 174.
Canidia = *Canidiella*, n. gen., 368.
Capparis cynophallophora, Pyralid larva on, 272.
Capulinia crateriformis, n. sp., 3.
 " *jaboticabæ*, 4.
 " *Sallei*, 4.
 Carabidæ feeding upon vegetable substances, 265.
Carneades holohërba, 225 (plate).
 " *Lagganæ*, 225 (plate).
Catocala Barnesii, n. sp., 190.

Catocala, larva of, 189.
Catocala, list of black-winged species of the United States, 191.
Catocala moderna, n. sp., 191.
 " new species from Texas, 191.
 " the genus, 188.
 " species taken in Manitoba, 95.
 Caudell, A. N., article by, 67.
 Centris Cockerelli, 363.
 " *Hoffmanseggiae*, 363.
Centris rhodopus, var. *pulchrior*, n. var., 363.
Ceratosoma = *Ceratogastra*, n. gen., 368.
Cerastoma Koebelælla, n. sp., 40.
 " Synopsis of species, 41.
 Change of preoccupied names, 347.
 Cheese and bacon fly, 159.
Chenopodium album, Aretian larva on, 325.
Chionobas Alberta, 365.
 " *jutta*, 366.
 " *varuna*, 366.
Chlorotettix nudata, n. sp., 340.
 " *stolata*, n. sp., 341.
 " *tonicata*, n. sp., 340.
 Choreutidæ, synopsis of genera, 238.
 Choreutis and its allies, North American species of, 236.
Choreutis Bjerkandrellæ, 241.
 " *extrincicella*, n. sp., 86.
 " *inflatella*, 242.
 " *leucobasis*, n. sp., 242.
 " *occidentella*, n. sp., 86, 242.
 " *onustana*, 242.
 " *soroculælla*, n. sp., 86.
 " Synopsis of species, 85, 241.
 " the genus, 240.
 " *virginiella*, 243.
Chrysomela varians, antenna of, 257 (fig.)
Chrysomphalus aonidium, 214.
 " *dietyospermi*, 214.
Chrysopa oculata, 60.
Chrysophanus dione, 365.
Cicadula poloria, n. sp., 346.
 Cicindelidæ of Kansas, 109.
Cicuta maculata, larva boring, 229.
Clepticus = *Mischoxorides*, n. gen., 368.
Clinoppleura flavomarginata, n. sp., 332.
Clisiocampa distria, a new popular name for, 27, 54, 68.
 Coccidæ, Bibliography of Massachusetts, 9.
 Coccidæ, new species of, 3, 64, 129, 205, 311, 360.
 Coccidæ, of the Ivy, 214.
 Coccidology, contributions to, 64.
 Cockerell, T. D. A., articles by, 91, 129, 297, 361.

- Cocoon of a Hesperid, 234.
 Cocos nucifera (Cocoanut Palm), larva
 injuring foliage, 157.
Calioxys Apacheorum, n. sp., 299.
 " *deplanata*, 297.
 " *Gilensis*, 299.
 " *grindeliae*, n. sp., 300.
 " *menthae*, 298.
 " *moesta*, 298.
 " *octodentata*, 297.
 " *Porterae*, n. sp., 298.
 " *ribis*, n. sp., 301.
 " *rufitarsis*, 298.
 " *Sayi*, 297.
Calioxys, tables for separating New
 Mexico species, 297, 300.
Cælonotus = *Protophidius*, n. gen., 368.
Cynocampe cynonympheata, n. sp., 104.
Colanix Julia, 8.
Coleosoma blanda, 98.
 " *floridana*, n. sp., 98.
Colias eurytheme, 366.
Colletes nigrifrons, n. sp., 304.
Coloradia Doris, n. sp., 46.
 Condemnable practices in generic re-
 visions, 166.
Copaxa multifenestrata, larva of, 236.
 Coquillett, D. W., articles by, 33.
Cosmia punctirena, n. sp., 222.
Crioceris merdigera, antenna of, 257
 (fig.).
Crioceris, mandible of, 259 (fig.).
Crotalaria longirostrata, larva within
 flowers of, 156.
Crustulina borealis, n. sp., 98.
 " table of species, 99.
Cyaniris pseudargiolus, proposed alter-
 ation of name, 91, 116.
Cymatophora evagaria, n. sp., 106.

Dactylopius citri, synonyms of, 215.
 " *Farnesianae*, 66.
 " *filamentosus*, 64.
 " *Irishi*, n. sp., 129.
 " *maritimus*, n. sp., 316.
 " *quercus*, n. sp., 315.
 " *Texensis*, n. sp., 65.
 " *vastator*, 64.
Danaïs archippus, late occurrence of, 2.
Dandelion, Aretian larva on, 375.
Deltocephalus apicalus, n. sp., 285.
 " *caparatus*, n. sp., 343.
 " *comatus*, n. sp., 343.
 " *elimatus*, n. sp., 345.
 " *gnarus*, n. sp., 345.
 " *grammicus*, n. sp., 204.
 " *Melsheimeri*, 207.

Deltocephalus Sonorus, n. sp., 345.
 Destructive green-pea louse, 50.
Diadasia apachea, 363.
 " *diminuta*, 363.
Diaspis Arizonicus, n. sp., 131.
Dichogramma Redtenbacheri, partial life-
 history of, 271.
Dichopetala brevicauda, n. sp., 331.
Dione Juno, 8.
 Diptera inhabiting wheat fields, 212.
Doberes Mexicanus, 235.
 Dodge, G. M., article by, 92.
 Dolichopodidae, a decade of, 134.
Dolichopus misellus, n. sp., 136.
 " *sincerus*, n. sp., 136.
Donacia crassipes, larva of, 249.
 " *piscatrix*, larva of, 249.
Donaciinae, larvae of, 250.
Doryphanta Porterae, n. sp., 91.
Drasteria conspicua, n. sp., 224.
 " *distincta*, 225 (plate).
Drosophila pollinosa, 36.
Dryas paphia, 7.
 Dyar, Harrison G., articles by, 16, 37,
 84, 117, 155, 156, 271, 284, 395, 347.
 Dyaria, notes on the genus, 284.

Eacles imperialis, var. *didyma*, 192.
 " var. *nobilis*, 192.
Eatonia scopulifera, 32.
Ecphora = *Ecphoropsis*, n. gen., 368.
 Ehrhorn, E. M., article by, 311.
 Ehrmann, G. A., article by, 348.
 Elwes, H. J., article by, 116.
 Entomological expedition into Southern
 Mexico, 213.
 Entomological muddle, an, 121.
 " " arejoinder, 193.
 Entomological Society of Ontario, an-
 nual meeting, 376.
 Entomological Society, election of offi-
 cers, 377.
 Entomological Society of Ontario,
 Montreal Branch, 120.
 Entomological Society of Ontario,
 Toronto Branch, 158.
 Entomological Society of the North-
 west (Canada), 225.
 Entomologists' Directory: H. Skinner,
 M.D., 119.
Eois Crossii, n. sp., 105.
 " *purpurascens*, n. sp., 105.
Epetra Arizonensis, n. sp., 100.
Epeolus Cressoni, 362.
 " *occidentalis*, 361.
Epeolus occidentalis, var. *segregatus*, n.
 var., 361.

- Epeolus remigatus*, var. *Martini*, n. var., 362.
Epermenia pimpinella, n. sp., 162.
Ephydra australis, n. sp., 36.
 Ephydriæ, new genera and species of, 33.
 Epilepsy, a parasite the supposed cause of some cases, 263.
Erebia discoidalis, 366.
 " *episodea*, 366.
Erebus odora at Orillia, 288.
Eriogonum latifolium, Coccus on, 316.
 Errata, 108, 120, 225, 367, 377.
Eucalptus striatella, n. sp., 163.
Eucorystes = *Eucorystoides*, n. gen., 368.
Eugenia jaboricaba, Coccus on, 3.
Eulecchia, new generic name, 347.
Eulepiste Cockerelli, n. sp., 307.
 " *Cressoni*, 306.
 " *maculifer*, 306.
Eulimacodes Telligii, n. sp., 46.
Euprepia caja, var. *Americana*, life-history of, 321.
Euptoieta claudia, 365.
 " *neuronia* of, 8.
Euryopsis 5-maculata, n. sp., 97.
Eurythmia Coloradella, n. sp., 175.
Eustixia pupula, larva of, 155.
Eutettix insana, n. sp., 203.
 " *stricta*, n. sp., 204.
Euzophera inornatella, n. sp., 173.

Felderia dorsimacula, n. sp., 328.
 " *flicornis*, 310.
 Fernald, C. H., article by, 236.
Ferreolomorpha, n. gen., 188.
 Field, H. H., article by, 166.
 Fletcher, J., articles by, 159, 192, 273.
 French, G. H., articles by, 188, 263.
 Fyles, Rev. Dr., accident to, 116.
 Fyles, Thomas W., articles by, 15, 87, 193.

Gastrophilus epilepsalis, n. sp., 263, 318.
Gastrops nebulosus, n. sp., 34.
Gelechia persicæella, 164.
 Geometridæ, new species of, 102.
 Gibson, Arthur, articles by, 2, 321, 369.
Gloveria Arizonensis, n. sp., 48.
 Glyptiptyx, synopsis of species, 84.
 " *40-punctata*, n. sp., 84.
Gnaphalium polycephalum, leaf-miner on, 241.

Gortyna erepta, 107.
 " *micacea*, type of genus, 225.
 Grant, C. E., article by, 287.
 Grapevine roots, Coccus on, 5.
 Grapta J-album, partial life-history of, 273.
 Grote, A. R., articles by, 7, 68, 107, 118, 119, 191, 209, 225, 289, 292, 352, 359, 367.
Gymnopternus mirificus, n. sp., 137.

Habrocestum signalum, n. sp., 101.
Hadena arctica, 287.
 " *ceriana*, n. sp., 220.
Hæmatopinus columbianus, n. sp., 215.
Hæmonia nigricornis, 249.
 " *zosteræ*, 249.
Halisidota propinqua, 235.
 Hancock, J. L., article by, 25.
 Hanham, A. W., article by, 365.
Harpalus caliginosus as a strawberry pest, 265.
Harpalus ruficornis, 160.
Harpalus ruficornis, eating seeds of strawberries, 268.
Harpalus pennsylvanicus eating seeds of ragweed, 270.
 Hawaii, larvæ from—a correction, 156.
 Heath, E. F., article by, 93.
Hemerophila pariana and its synonyms, 236.
Hemerophila, the genus, 239.
 " *vicarialis*, 240.
 Hempel, Adolph, article by, 3.
Hercostomus anarmostus, n. sp., 139.
 " *table of species*, 138.
 " *zeilus*, n. sp., 138.
 Hine, J. S., article by, 247.
Hipparchia Ridingsii, 366.
 Hofmann, Dr. O., death of, 118.
Holconotus = Aulonotus, n. gen., 368.
 Holland, Dr. W., appointed Director of the Carnegie Museum, 216.
Honora fumosella, n. sp., 174.
 Howard, L. O., articles by, 54, 167, 353.
 Hubner's Tentamen and Verzeichniss, 236.
 Hulst, Geo. D., articles by, 13, 102, 169.
 Hulst, Rev. G. D., death of, 369.
Hyadina albovenosa, n. sp., 34.
Hydræcia cerrusata, life-history of, 231.
Hydræcia circumlucens, life-history of, 283.
 " *Harrisii*, life-history of, 282.
Hydræcia impecuniosa, life-history of, 279.

- Hydræcia iniquasita*, 283.
 " larval characteristics, 227.
 " lunata, 107.
Hydræcia marginidens, life-history of, 229.
Hydræcia micacea, 229.
 " new histories in, 226, 276.
 " nictitans, 367.
Hydræcia nictitans, type of genus, 209, 225, 293.
Hydræcia rutila, 63 (plate).
 " life-history of, 276.
Hydræcia, species taken in Manitoba, 95.
Hydræcia stramentosa, 61 (plate), 119, 133.
Hydriomena amorata, n. sp., 104.
Hydrometra lineata, a study of, 70.
 " stagnorum, 71.
 Hymenoptera, some changes in generic names, 368.
Hyphantria cunea, 16, 87, 123, 193.
 " punctata, 87, 123, 194.
Hyphantria punctatissima, 16, 87, 122, 193 (plate), 287.
Hyphantria textor, 16, 87, 123, 194 (plate).
Hyphantria, var. *budea*, 16.
Hypoclopus griseus, 307.
 " mortipenellus, 307.
Ichneutes sp., parasitic on the purslane sawfly, 54.
Idiocerus distinctus, 208.
 " Duzei, 207.
 " lachrymalis, 207.
 " mimicus, 208.
 " pallidus, 208.
 " perplexus, 207.
 " productus, 208.
 " ramentosus, 207.
 " striola, 207.
 " verticis, 207.
 Index to Entomological Reports, 347.
 Insect bites and the effects thereof, 17.
Issoria lathonia, 7.
 Ivy, Coccidæ infesting, 214.
Jassidæ, new, from the South-west, 200.
 " notes on *Idiocerus*, 207.
 " two new species of, 285.
 Jassid fauna, additions to Western, 337.
 Johnson, C. W., article by, 246.
 Johnson, Willis G., article by, 56.
Kermes trinitatus, n. sp., 205.
 King, George B., articles by, 9, 214, 360.
 Knaus, W., article by, 109.
Laphygma flavimaculata, 156.
Larrea tridentata, Coccus on, 130.
Larvæna argentimaculella, n. sp., 161.
Lecanium hesperidum, 214.
 " maculatum, 214.
 " obscurum, n. sp., 5.
 " oleæ, new parasite of, 349.
 " *Silveirai*, n. sp., 5.
Ledereria virens, type of genus, 209.
Lepidium virginicum (Peppergrass), larva eating seeds, 155.
 Lepidoptera, a Natural History of the British: J. W. Tutt, 351.
 Lepidoptera, new North American, 42, 102, 161, 169, 208, 217, 242, 307.
 Lepidoptera, notes on captures, 93, 119.
Limnitis ursula, var. *cerulea*, n. var., 348.
Limneria = Limnerium, n. gen., 368.
Liogaster = Liotryphon, n. gen., 368.
 Loboptera Americana, 329.
Lonatura nebulosa, n. sp., 341.
 " *noctivaga*, n. sp., 342.
 Lounsbury, C. P., article by, 17.
Lucasiella, n. gen., 32.
 " Halleri, 33.
 " plumifer, 33.
 " plumipes, 33.
Luperina testacea, type of genus, 211.
Lycæna boetica, 156.
 " rustica, 365.
 " sœpiolus, 365.
 Lyman, Henry H., articles by, 119, 121, 286, 319.
 Lyman, Henry H., biographical sketch of, 1.
 Lyman, Henry H., portrait of, 1.
 MacGillivray, A. D., article by, 177.
 Mally, C. W., appointed assistant Entomologist of Cape Colony, 55.
 Mally, C. W., article by, 51.
Mamestra negussia, n. sp., 219.
Mamestra, species taken in Manitoba, 95.
 Manitoba Lepidoptera, captures of, 93.
Margarodes flegia, life-history of, 117.
Maricopa albocostella, n. sp., 176.
 Martin, J. O., article by, 70.
 McNeill, Jerome, article by, 77.
Megasia cinctella, n. sp., 172.
 Melander, A. L., article by, 134.

- Melanoplus differentialis in New Jersey and Pennsylvania, 28.
 Melitæa Chalcedon, *ab. fusimacula*, 42.
 " *ab. Mariana*, 42.
 " *Harrisii*, 395.
 " *Senrarii*, n. sp., 43.
Melitara junctolineella, n. sp., 173.
 Merolonche spinea, 336.
 Metanastria psidii, 235.
 Metzneria lapella, life-history of, 15.
Microtes, n. gen., 329.
 " *nubila*, n. sp., 330.
 Mieza igninix, 39.
 " *psammitis*, 39.
 " *subfervens*, 39.
 " Synopsis of species, 39.
Mincula rubescentella, n. sp., 169.
 " *scitulella*, n. sp., 169.
 Mites, on two genera of, 30.
 Moffat, J. A., articles by, 61, 133.
Monoptilota, n. gen., 13.
 " *nubilella*, n. sp., 14.
 Murtfeldt, Miss M. E., article by, 161.
Myelois dulciella, n. sp., 176.
Myiocnema, n. gen., 349.
 " *Comperi*, n. sp., 349.
Nectarophora destructor, n. sp., 58.
 Needham, James G., article by, 69.
Nematoproctus venustus, n. sp., 142.
Nemoria Dyarii, n. sp., 105.
Neolophus persimplex, n. sp., 327.
Neonympha canthus, 366.
Neophasia epyaxa, 358.
Neophasia Terlootii, new variety of, 358.
Neophasia Terlootii, notes on, 358.
Neophasia, var. *Princetonia*, n. var., 358.
Nephelodes pectinatus, n. sp., 221.
Nephopteryx modestella, n. sp., 170.
 Neuration of Butterflies, 7.
 Neuration, the principle which underlies the changes in, 269.
Noctua inopinatus, 225 (plate).
 Noctuid genera, types of, 209, 292.
 Noctuidæ taken in Manitoba, 93.
Nomada Illinoiænsis, n. sp., 294.
 " *parva*, n. sp., 294.
 " *Sayi*, 293.
 Nomenclature, a question of, 318.
Nostima, n. gen., 35.
 " *Slossonæ*, n. sp., 35.
Nymphæa alba, *Donacia* larva on roots, 253.
 Oak-gall from New Mexico, a new, 91.
Obba = Tosquinella, n. gen., 368.
 Obituary, 118, 368, 369.
Oehria flavago, 229.
Ocotoma plicatula, pupa of, 250, 262 (figs.).
 Odonata, nymphs of northern, still unknown, 69.
Oenothera biennis, larva mining leaves, 162.
Omiodes Blackburni, 157.
Omophron labiatum injuring young corn, 270.
Ophiodes = Ophiogastera, n. gen., 368.
 Orange, Coccus on, 64.
 Orchelimum, key to species of, 77.
Orchemia Diana, 238.
 " the genus, 238.
Orgyia Oslari, n. sp., 45.
 Ormerod, Miss E. A., degree of LL.D. conferred upon, 168.
 Ormerod, Miss E. A., Twenty-third Report on Insects, 159.
Ornithodoros Savignyi, 20.
 " *tricatus*, 20.
 Ortaliidæ, new North American, 246.
Ortholophus piger, n. sp., 327.
 " *variabilis*, 310, 327.
 Orthoptera, new or little-known Californian, 329.
 Orthoptera, notes on Tettigean group, 25.
 Osborn, Herbert, articles by, 215, 285.
Pamphila hianna, 365.
 " *Manitoba*, 365.
 " *ottoe*, 367.
 " *uncas*, 367.
Panurginus Cressoniellus, 364.
 " *Portera*, n. sp., 364.
Papilio asterias, var. *semi-alba*, n. var., 348.
Papilio Machaon, var. *Alaska*, 119.
Papilio philenor, var. *obsoleta*, n. var., 348.
Papilio troilus, var. *Texasus*, n. var., 348.
Papilio Turnus, 119.
Paraclissus hybridus, n. sp., 141.
Paratissa, n. gen., 36.
 " *pollinosa*, 36.
Paramesus furcatus, n. sp., 285.
Parasa prasina, 347.
 " *wellesca*, 347.
Parkinsonia Torreyana, Coccus on, 131.
Parotis flegia, 117.
Passadena, n. gen., 171.
 " *constantella*, n. sp., 171.

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